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# MINNESOTA MEDICINE

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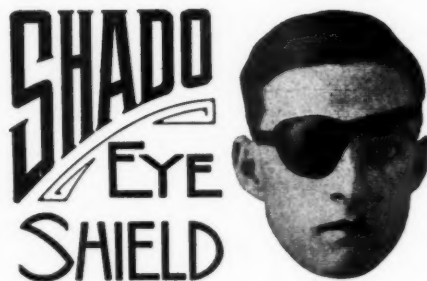
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*Journal of the Minnesota State Medical Association. Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society.*

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## THREE CASES OF BRAIN SURGERY\*

ARNOLD SCHWYZER, M.D.

*Saint Paul*

IF A GENERAL surgeon operates nowadays on a brain tumor there ought to be some particular reason for his doing so, because this work has become a specialty and, in our country, there are a number of the foremost masters in this field. In the last two years we have operated upon five such cases of brain lesion. In one the tumor gave no clue as to its localization. The bedridden patient was in a most pitiable condition and a subtentorial decompression was done to relieve the pain and to save the little vestige of eye sight remaining. The headaches were relieved, but the patient died soon. In a second patient already in a stuporous condition, the roentgenologist and the ophthalmologist had both made a definite diagnosis of tumor of the hypophysis. The posterior clinoid processes of the sella turcica were absent. The whole sella was greatly flattened and drawn out backward as seen in suprasellar tumors; but there was no tumor. At postmortem an infiltrating tumor of the left frontal brain was found.

The other three patients I can show you here tonight. The first two of these patients had refused to go to more specialistic surgeons after our limited experience had been freely stated, nor was there much time to lose. The third patient seemed to be less of a difficult surgical problem than the other two.

The first case, a woman thirty-three years old, was kindly referred to me on November 3, 1927, by Drs. Binger and Kamman. The salient points of the history are as follows: She had always been well up to the present illness. Three years ago she noticed a beginning deafness of the left ear, steadily increasing. Seventeen months ago, about a month before her youngest child was born, the vision became poor and she began to see double. At the same time weakness in the legs started, especially in the left. There was no pain

in the legs. As time progressed she became worse, finding that she could not think as well as formerly. She would easily forget things. She had never vomited except a few times in August 1927 when she had influenza. Only once was the vomiting projectile. The patient had never had headaches or pain in the neck. There had been no preceding injury.

Upon examination, the chest and abdominal organs were normal. X-ray plates of the head showed nothing abnormal. The sella turcica in particular was normal in appearance.

*Neurological Examination* (mostly from notes by Drs. Kamman and Binger):

Cranial nerves:

I—Olfactory, normal.

II—Eye sight reduced to counting of fingers. Bilateral papilloedema, more marked on left, where the swelling of the nerve head amounts to four diopters; on the right side two to three diopters. Small retinal hemorrhage below in left eye.

III, IV, VI—Bilateral nystagmus, fine on looking toward right, coarse towards left. On right conjugate deviation the left eye turns somewhat down. Proptosis in left eye, 2. Lid space on left side 3 mm. larger than on right.

V—Left corneal reflex absent. Delayed contraction of left masseter and temporal muscles. Deviation of jaw toward left (Pterygoids).

VII—Weakness of central type in left facial.

VIII—Left nerve, complete deafness. Weber lateralized toward right. Hearing on the right side normal. Dr. Binger had made equilibratory tests which showed destruction of the left vestibular nerve and lack of response from the vertical semicircular canal of the right ear. All other cranial nerves normal. (No dysphagia.)

Motor system:

Arms—Left arm shows hypotonia, adiadokokinesis and intention tremor. No ataxia. Muscle strength normal. Right arm normal throughout.

Trunk—No deviation of umbilicus.

Legs—Some hypotonia and slight ataxia of left leg. Muscle strength normal on both sides.

Gait—Patient walks slowly and with a wide base.

Station—Slight Romberg, but not lateralized to either side.

Sensation—Normal throughout for touch, pain, heat and cold. Passive motion, position and vibration sense,

\*Read before the Ramsey County Medical Society December 30, 1929.

stereognosis, topognosis and two-point discrimination preserved in all areas of the body.

Reflexes—On left arm slightly diminished. Left knee jerk pendular. No Babinsky or ankle clonus.

Mental—Negative. Slight slurring and stumbling over test words.

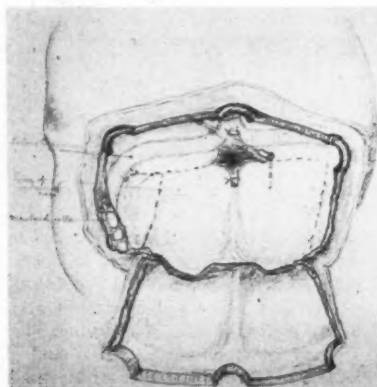


Fig. 1. Case 1. Sketch made by the operator directly after the operation to show the extent of the bone flap, the opening of the large mastoid cells, the dural flap to cover them, the exposure of the lateral sinuses and torcular Herophili, the puncture of the left lateral ventricle, the division of the falx cerebelli and the broken off posterior rim of the foramen magnum.

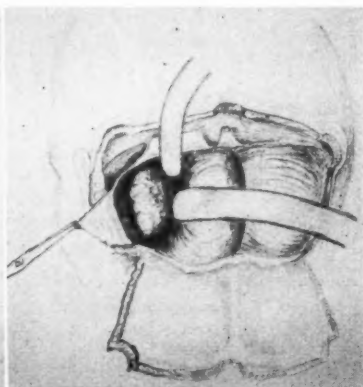


Fig. 2. Case 1. Tumor as it presented itself. We did not succeed in giving the proper impression of the depth of the tumor, which reached the midline in front of the pons. The mobilization of the cerebellum may be noticed and the covering of the mastoid cells by the dural flap.

Diagnostic impression (Dr. Kamman): History of progressive deafness of three years, together with choked discs, without headache but positive cerebellar signs and absence of left corneal reflex are strongly suggestive of a tumor in the left cerebello-pontile angle, probably neurofibroma of left eighth nerve.

To this may be added the data furnished by Dr. Binger, who found a complete destruction of the left cochlear and vestibular nerves and also of the fibres from the right vertical semicircular canals. They are the first ones to be damaged by pressure from the other side as they run more medially in the medulla. I. H. Jones of Philadelphia found this to be a regular and characteristic symptom in tumors of the acoustic nerve.

Most of this examination was made on October 28, 1927. The patient was then rapidly getting worse. She seemed forgetful and the stream of thought became delayed. On November sixth, I dictated: Patient is less responsive than two days ago. When asked to get up she stares and after my questioning says, after some delay, that she is thinking. When questioned what she is thinking, she answers "seriously." She declares on inquiry that it is hard for her to think. In these few days a distinct degree of stupor had developed.

Operation November 7, 1927. The operation was done entirely under local anesthesia, which was apparently perfect even during the intra-cranial maneuvers. The incision was made, with a moderate convexity upward, from behind one mastoid process to a corresponding point on the other side. From the ends of this cut the

bend. Bleeding from emissary veins was controlled by bone wax and compression. From the two lateral drill holes we divided the bone downward toward the foramen magnum with Dahlgren's forceps. Apparently through pressure the bone had become thin and brittle in the lower area. A Doyen chisel with a protecting projection on the under side of the bit was then inserted on each side at the lower end of the lateral bone incisions and with a stroke or two the bone was split for some distance toward the midline. It is well known that in these cases of markedly increased intracranial pressure the cerebellum is commonly wedged into the foramen magnum and that the slightest additional pressure on the medulla oblongata will cause apnea and perhaps prompt disaster. We therefore carefully pried the bone loose by using leverage low down in order to avoid an inward tilting of the lower rim of the bone flap. The bone did not break where we had used the chisels, but the posterior rim of the foramen magnum broke off in one piece with the occipital flap. In two other cases of ours with similar procedure the break occurred at the desired level, but in this patient we had gone farther down and the intracranial pressure had greatly thinned out the bone, leaving intact only the strong median vertical ridge. A shearing off of the medulla was averted by the prying and steadying action of two elevators near the base of the flap, while this latter was gently and slowly raised. That no untoward symptoms followed was perhaps due to two reasons: first, that the lateral incisions of the soft parts were liberal and that therefore the occipital bone did not swivel on firm muscular masses; and sec-



ond, that as soon as the flap was somewhat raised we forcibly pulled on it straight backward with only gradual tilting, relying at the same time on the two elevators with their gentle but energetic lifting action.

The circular part of the occipital sinus (marginal sinus) which runs along the edge of the foramen magnum, was not injured. The two lateral sinuses were now freely visible in their course and all of the torcular. Enough bone had been removed so that we could tap the left lateral ventricle above the lateral sinus, in the hope of reducing the great tension. However, only a few drops of clear fluid escaped. In order to get sufficient access, the bone had to be removed to the edge of the sigmoid sinus on the left side. The x-ray picture had shown that the mastoid cells reached unusually far back. They had to be opened widely. Two of the cells were quite large, one of them eight millimeters long by a width of four or five. Here, Lane's forceps were most useful. The dura was then opened and the occipital sinus with the falx cerebelli divided between clamps and tied off with fine catgut. This allowed better displacement of the cerebellum. The dural incision ran about one centimeter below the lateral sinus, but on the left side a large triangular flap with a lateral base was formed in order to cover the mastoid cells. The base of this flap was at the very edge of the sigmoid sinus.

Gently lifting the left half of the cerebellum with a spatula and following the posterior aspect of the petrous bone along its lower border we reached the tumor in the depth. It was markedly deeper than I was able to indicate in the sketch. It looked bluish and cystic on account of the distended arachnoid, which covered it. Some fluid escaped when this covering was opened. The tumor itself was irregularly nodular and rather friable. No distinct capsule could be made out. The part which could be seen was, however, sharply outlined. We then gradually removed in pieces what seemed to be the bulk of it. The weight of the removed portion was nine grams. Feeling with the finger we were sure that there was some remnant left. However, we had reached forward in the midline to the clinoid area, which had not shown any signs of absorption in the roentgenogram. Toward the brain stem we could not make out a clean outline, but further advance would have greatly endangered the most vital structures. With Cushing's experience in attempts at complete removal in our mind, as related in his classic book on "Tumors of the Nervus Acusticus," it was decided to do no more, though W. E. Dandy in his publication in 1925 in "Surgery, Gynecology and Obstetrics" had demonstrated that a complete removal of these tumors may be possible. A good number of years of relief with an undamaged facial nerve was on one side of the scales, and on the other was possible complete removal of the tumor but certain sacrifice of the facial nerve with marked danger of keratitis and with great risk of prompt death. This risk appeared prohibitive because of the inability to find a line of cleavage toward the pons. On the other hand the thought of an energetic postoperative radium treatment gave us some comfort in our decision.

The dura was sutured back into place by the finest

silk sutures. The bone flap was turned up under forcible pulling backward to avoid any damage at the foramen magnum. Strong forty day chromic catgut was used for muscles and fascia, which did not, however, prevent a gradually developing backward tilting of the flap. We did not remove the bone, as is usually done,



Fig. 3. Case 1. Fragments of the tumor as they were removed (natural size).

because with a wide opening to above the torcular with free exposure of both lateral sinuses the replacing of the protective shell seemed very desirable. On the other hand a more limited exposure, we felt, would have rendered the intracranial manipulations more dangerous and less gentle—at least in our hands.

At the end of the operation the patient was in good condition. Though no general anesthetic was given at any time and only 0.5 per cent novocain had been used for the soft extracranial parts (assisted by 1/6 grain of morphine and 1/150 of atropin, given before the operation), the patient moaned only once. This was when the bone flap was turned down. At no time was there interference with the respiration. During the work on the tumor the patient was motionless and breathing quietly, though conscious.

Of the postoperative course a few notes may be of interest. One hour after returning from the operating room the patient was asked by one of the doctors: "Who is speaking?" and the answer was correct. The face was not paralyzed. At 7 p. m. (six hours after the operation) she talked quite rationally and surprisingly much; in fact, this was in striking contrast to her behavior on the last day before the operation when a stupor had become apparent and she had not talked except when asked questions, and even then only slowly with a much blurred consciousness. Now she wanted to know what was going to happen and on being ques-

tioned said she had pain, at times even a great deal, during the operation, but said "I did my best. I wanted to see this thing through." Her vision seems not damaged, she counts fingers correctly. She swallows freely without coughing afterward. She can close the eyes and whistle. Her pulse is one hundred and twenty-six.

distal end of a heavy lead tube to avoid lateral rays. The filtering consisted of one millimeter of brass (the radium containing capsule), one millimeter of lead and one and a half centimeters of wood. Fields all around the head allowed us to give 7050 milligram-hours of hard rays at one session without damage to the hair

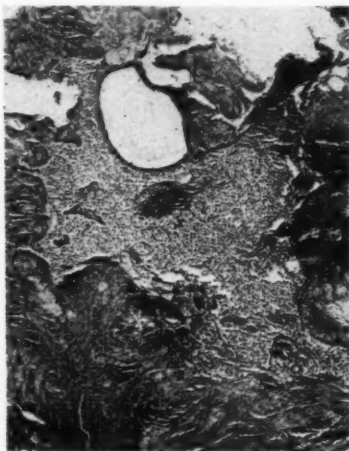


Fig. 4. Case 1. Low power; showing palisade spindle cell strands and reticular areas; also cysts.

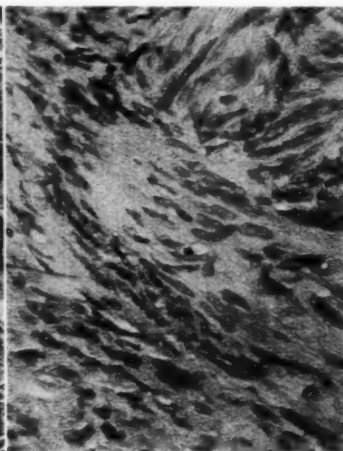


Fig. 5. Case 1. High power. Strands of spindle cells.

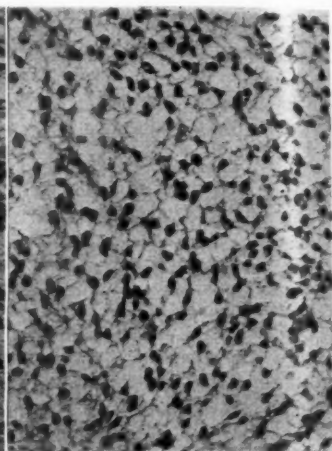


Fig. 6. Case 1. High power. Reticular area.

On the day after the operation she said she could not complain. In the evening she appeared very normal in her behavior, smiled and did not talk too much. She has a little pain where she was operated upon. Asked to multiple five times seventeen she very promptly answered: "Eighty-five." Nevertheless after a while she appeared tired out and was not sure that she had been operated upon. "Something has happened; something was done to the back of the head, but I do not know if that was the operation."

On the next day (forty-eight hours after the operation) she declared she felt better. The trigeminus, which is most frequently affected in these tumors of the acoustic nerve, due to its proximity, and whose motor root had been found parietic in our case before operation, proved not to be any further damaged, as the sharp and blunt end of a lead pencil was differentiated exactly all over the face.

On the fifth postoperative day oozing of cerebrospinal fluid required dressing. On the following day the corneal reflex, which had been absent before the operation, was found to have returned, though it was still weak and retarded. On November 14, one week after the operation, the nystagmus was much improved. Cushing considers the nystagmus in acoustic tumors to be due to cerebellar rather than vestibular disturbance. The more the cerebellum was manipulated at operation the more the nystagmus was noticed to be increased. On December 5, the patient was discharged.

A month later she returned for radium treatment. From a distance of six centimeters from the skin 75 milligrams of radium were applied. It was put at the

follicles. When she came for this treatment her mental condition was not as good as it had been. This dated back to a ride over a rough road four days previously.

Dr. Kamman made a neurological examination on January 7, 1928, with the following report: "Marked subsidence of all pathologic reflexes. The corneal reflexes are now equal. The proptosis has receded and the facial palsy is clearing up. The extra-ocular palsies are about the same as at the preoperative examination. The palate rises in the midline and there is no pharyngeal anesthesia. The patient's mental condition is much clearer than on previous examination. She is well oriented in all spheres, responds fairly promptly and accurately, and expresses no hallucinations or delusions. There is some small amount of mental confusion, but not nearly reaching its former degree of intensity."

When seen again in May, 1928, a considerable further improvement was noticed. She could talk freely, the voice was stronger. She looked well, could walk alone, had gained twenty-five pounds, and had no trace of headache. Her husband stated that she was reading a great deal, books and newspapers.

On September 30, 1929, she came again for examination. Since the operation she had gained from 85 pounds to 135 pounds. She read small print very fluently. She was feeling "fairly well." There was a sensation of pressure in the head, though she had no headache. The left eye was still turned down a trifle which caused double vision in some positions.

Radium treatment will be continued for a long time at intervals, in the hope of delaying signs of recurrence.

Time does not permit us to go into a more general discussion of this subject. Prompt action was needed in our case when a distinct stupor made its appearance, and when the greatly damaged eye sight and the choked discs with a retinal hemorrhage warned us of the rapidly approaching irreparable blindness. In subtentorial tumors the papilloedema with great distension of the retinal vessels is a very regular and early danger signal. It occurs earlier and reaches a higher degree than in most other brain tumors. Nevertheless, as I might mention in parenthesis, I found it once completely absent in a cerebellar tumor of large size. This patient had free flowing of cerebro-spinal fluid from the right nostril, so-called cerebro-spinal rhinorrhea, which of course relieved the tension.\*

As to the microscopic study of the case, let me say that without the help of Cushing's book the diagnosis would have been uncertain. However, Cushing has cleared up the character of these acusticus tumors and has shown that they belong in one group, are not infiltrating and are well encapsulated. They originate from the supporting structure of the nerve, which in the portion near the cerebellum is glia, while after a course of from seven to ten millimeters away from the cerebellum a transition into connective tissue endoneurium occurs. The tumor arises apparently from the incompletely differentiated supporting structure of the acusticus, and glia-like reticular areas alternate with cellular strands of long connective tissue cells which are arranged in interlacing bands and whorls. The staining qualities being somewhat different from adult tissue, whether glia or fibrous, leads Cushing to the opinion that the tumor arises from embryonal remnants. Ganglion cells may be normally found in the nerve (the cochlear and the vestibular roots have each a ganglion at their distal end) and ganglion cells are at times found in varying numbers in the acoustic tumors. These growths are always surrounded by the pia-arachnoid, because the arachnoid enters for several millimeters into the internal auditory canal, enclosing the nerve. In our sections, the picture corresponded pretty well with Cushing's description. The bulk was composed of long cells in palisade arrangement, forming interlacing strands and whorls. These alternated with

areas of neuroglia-like reticular structure with fewer nuclei of a round shape and a fibrillar network between the cells. At the periphery of the tumor there were numerous cystic spaces, many of them quite large. The walls and inter-spaces between the cysts are of orderly design and have again palisade arrangement of densely arranged cells. They are, therefore, part of the tumor. The blood vessels showed marked hyalin degeneration, which Cushing declares to be one of the characteristics of these neuro-fibromata of the nervus acusticus.

The history of the second case is the following:

Mrs. J. G., forty-eight years old, was referred to me on May 1, 1928, by Dr. Binger because of a suprasellar tumor. Two years previously, in May 1926, the patient had had a fainting spell. She lost consciousness and had foam showing from the mouth. This occurred at night and the following morning she could not see out of the left eye. In fact, she had been able to see hardly anything with either eye for two weeks, after which the right eye improved gradually. A numbness in the left hand had been felt and she had headaches and pressure in the left frontal area, which necessitated morphin. The vision remained blurred; she could not recognize, for instance, the features of her nurse. After rest in bed for five weeks the visual acuity had improved to the point that she could recognize flowers in the room and their colors. The condition was considered by her physician to have been a stroke of apoplexy. On the second of November 1926, Dr. Binger of St. Paul was consulted on account of the very poor vision.

The left eye was amaurotic with the exception of a very limited area of perception temporally and upward near the periphery of the field of vision. The right eye had a concentric narrowing of the field of vision with a vision of six-tenths. Colors were seen centrally only.

On February 9, 1927, the field of vision had changed in a manner which became significant and led to an x-ray study of the case. In the left eye there was no change; there was only the mentioned small area of perception laterally, no perception in the nasal field. In the right eye, however, the vision in the temporal field was greatly reduced as compared with the findings three months before.

Roentgen pictures then demonstrated a tumor above the sella turcica. The location of the tumor made it of doubtful operability and x-ray treatment was tried. Four series of ten to twelve treatments each were given between May and December 1927. The headaches were considerably relieved, but the ocular findings remained very much the same. In May 1928, when I first saw the patient, she stated that for the last five weeks there had been almost a constant pain in the right side of her face shooting into the left eye, the worst pain being located in the right upper jaw area.

\*The case was published in the St. Paul Medical Journal in 1902.





Before doing this, the pedicle of this flap, directly over the ear, was tied off in three portions with deep reaching catgut sutures. Drill holes were then made. Between two posterior holes and again between two anterior ones we cut through with a Gigli saw to insure exact opposition on closing, while the rest of the bone

time the frontal lobe was displaced. She was perfectly conscious. She only complained at the beginning of the skin infiltration and towards the end when we sutured the skin, because the operation had taken so long that the novocain anesthesia had worn off. At the end of the operation the patient appeared really in ex-



Fig. 9. Case 2. Skiagram showing calcified suprasellar area.

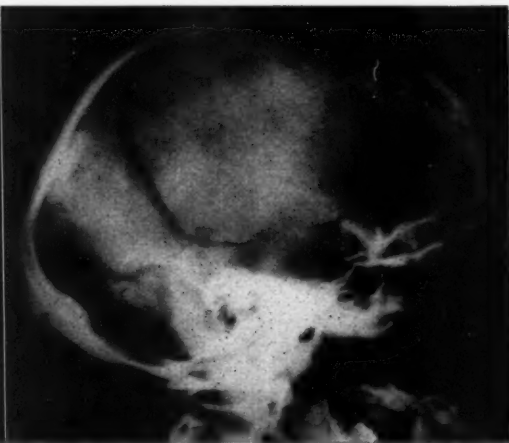


Fig. 10. Case 2. Skiagram showing extent of craniotomy.

incision was made with Dahlgren's bone shears. The pedicle was about six or seven centimeters wide. The widest diameter of the bone flap anteroposteriorly was twelve centimeters. We had difficulty inasmuch as the bit of the Dahlgren forceps broke, but as we were using de Quervain's modification of the forceps, which consists of a guard for this bit, it saved us from disaster. The head end of the table was then raised to about 40 degrees. The dura was cut about one centimeter from the bone surface with the pedicle posteriorly. Covering the brain with pads of moist cotton we gradually insert rubber strips over the frontal brain so as to protect it. The brain gradually had to be brought backward and outward. The orbital roof was laid bare, and gradually we created room. Then we came toward the clinoid process. This was a very slow process as we wanted the brain to change its form very gradually to avoid even fine lacerations. Now we could palpate in the midline or rather somewhat to the left a hard mass which was strongly pulsating. In size it corresponded to the tumor seen in the x-ray plate; it seemed even somewhat larger. Felt from the left lateral side, the pulsation was again directly under the finger and it was now clear that we were dealing with an aneurism of the internal carotid artery at the point of its division into several branches at the level of the circle of Willis. The dura was sewed back into place with fine linens and the bone flap replaced. A few linens in front and behind re-united the galea aponeurotica and the temporal muscle. The skin was closed by interrupted linens, closely and exactly applied. The catgut sutures (Heidenhain) at the base of the flap were left untouched. The patient was in good shape all through the operation, even during the

cellent general condition. Once during the operation when the brain was displaced she tried to vomit, but this lasted only a moment. Right after the operation she counted fingers with the right eye at three and a half feet while formerly only at two feet. This was undoubtedly due to the better light in the operating room. Her speech and sensorium seemed to be perfect. One hour after the operation the patient was re-examined; she differentiated between the smell of a rose and that of sweet peas in a very positive way. During the first twenty-four hours after the operation our patient vomited four times. She had vomited readily all her life. The menses, for instance, were always or almost always accompanied by vomiting.

We knew now what the pathology was and immediately had decided to ligate the left common carotid as soon as it could be done. The temperature remained normal, reaching only once 100° after some stitches were removed one week after the operation. On May 19th, ten days after the operation, the accompanying photograph was taken.

On May 21st, twelve days after the craniotomy, we ligated the left common carotid artery, again under local anesthesia through an incision parallel to the natural skin folds of the neck. The carotid was ligated with a forty-day chromic catgut and a few millimeters above this a silk ligature was put in to make the obstruction more permanent.

Practically immediately after the ligature of the carotid artery the patient felt better, though already since the craniotomy the pressure in the head had lessened. While she had had daily headaches for two years which had required constant use of bromides and luminal, the pressure in the head was so much better after the liga-



tion of the carotid that no such medication was any longer needed. Her head was clearer. The pain in the eyes and in the right side of the face and the right maxilla had already practically disappeared after the craniotomy and before the ligation was made.

After the ligation she vomited once, a few hours

was able to leave the hospital "feeling fine" as the nurse recorded.

On June 20th when the patient was brought to our office the bony apposition was perfect; no ridge could be made out.

On October 9th the patient came to our office with



Fig. 11. Case 2. Ten days after craniotomy.

after the operation, perhaps from the novocain. In the night after the ligation she slept "fairly well." The next day she was allowed to go to the bathroom. Our patient appeared normal and clear and well oriented. Seven times eighteen, which she had not been able to figure out four days previously, was now promptly worked out as equaling 126—as promptly as only a healthy and somewhat trained person could figure. On being asked, how much was 13 times 14, she answered again surprisingly soon, 182. When we uttered our surprise at the rapidity of the answer she said she had been doing much of this kind of arithmetic in her daily work as a cashier.

An interesting surprise awaited us at this junction when we discovered, as soon as we took her away from this abstract arithmetic and asked her a most simple question of subtraction in applied arithmetic, that she was unable to answer correctly. She was unable to figure out what year she came to this country, though she knew that the year was 1928 and that she had been for twenty-seven years in the United States. She answered 1921, then 1919, then 1909 and then had to give it up. This may have been due, at least partly, to a rapid tiring.

On June 2nd the eyes were tested; and yielded about the same findings as on pre-operative examination. But on the nasal side of her right eye the patient, saw (as she thought) much better: she counted fingers at six feet. The outer optic fibres seemed therefore to have improved somewhat even in this short time. The eyes tired very rapidly and the patient declared she had seen "wonderfully well" early that morning. On that day, June 2nd, twelve days after her second operation, she

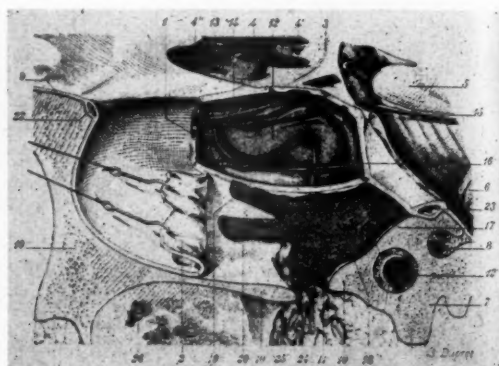


Fig. 244  
Le sinus caverneux gauche, vue latérale.  
(La paroi externe a été relevée pour montrer le contenu du sinus.)

1, sinus caverneux. — 2, drapeau, origine au nez. — 3, diaphragme de l'ophthalmie. — 4, chiasma optique, avec 5, bandelette optique; 6, nerf optique. — 7, péricarotidien. — 8, nerf. — 9, canal auditif interne avec les trois nerfs qui le traversent. — 10, petite aile de l'ophthalmie. — 11, grande aile de l'ophthalmie. — 12, trou oval. — 13, 14, carotide interne. — 15, artère ophthalmique. — 16, nerf moteur oculaire commun. — 17, artère maxillaire. — 18, nerf maxillaire. — 19, nerf maxillaire. — 20, maxillaire supérieure. — 21, maxillaire inférieure. — 22, sinus de l'oculaire. — 23, sinus pétreux supérieur. — 24, sinus du trou oval. — 25, sinus du trou pour se rendre à 25, plexus veineux pterygoidien. — 26, muscle pterygoidien externe.

Fig. 12. Internal carotid seen in its passage through the cavernous sinus and emerging upward into the cranial cavity to the side of the optic chiasm (from Testut, Anatomie Humaine).

her sister. The record reads that she counted fingers at six feet. The patient was doing all her house work and tending to the furnace alone. It is noteworthy that the eyes had improved somewhat in the first twelve days after the ligation, but had almost remained at that level. This is, of course, what one expects in case of optic atrophy. She can read the headlines on newspapers.

I have seen two other patients with aneurysm of the internal carotid artery. These were cases of exophthalmus pulsans due to formation of an aneurysm of the internal carotid into the cavernous sinus. The eye was protruding severely, pulsated, was engorged, and a loud swishing pulsatory noise could be heard when the stethoscope was put to the skull. In this latter location, aneurysms are not so very rare, but of the location above the cavernous sinus, where the artery divides into its several branches, I had never seen an instance. Nevertheless, even here aneurysms have been observed.

Sitting next to my countryman and friend from student days, Dr. Adolph Meyer, Professor of Psychiatry at Johns Hopkins University, at a banquet given in his honor about six weeks after this operation, I started to speak of the case,

mentioning the x-ray findings, laying stress on the extramedian position over the clinoid. Dr. Meyer quietly asked, "Could it have been an aneurysm?" When I asked him in surprise how he happened to think first shot of the right thing,

blood pressure was 124—80, the pulse 70.

On close inquiry into the character of the attacks the members of the family stated that the left side of the body was never involved in the convulsions. In the mild attacks the right leg and arm were stretched out rigidly. When the attack was severe there also occurred

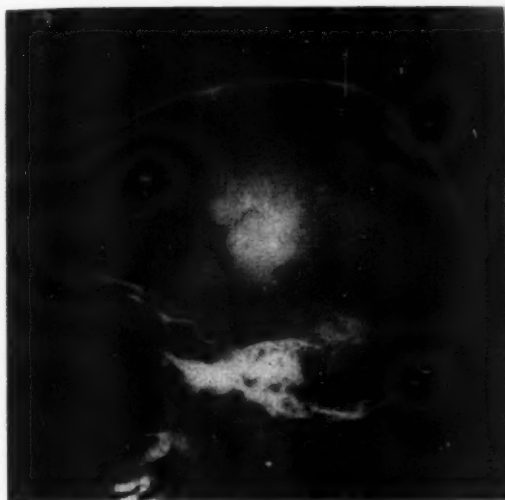


Fig. 13. Case 3. Calcified tumor in parieto-temporal area.

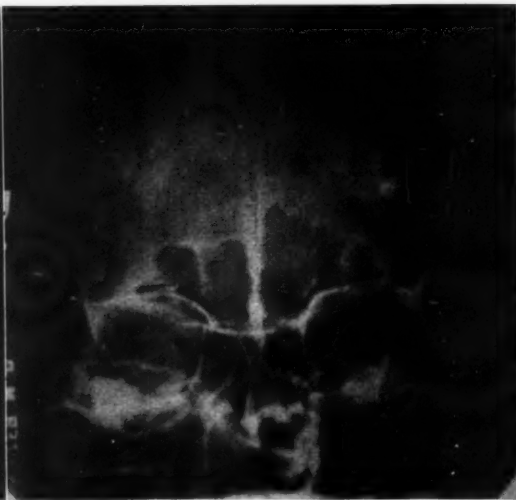


Fig. 14. Case 3. Calcified tumor in left parieto-temporal area.

he answered smilingly, "Well, I have seen two such cases."

The roentgenologist had been misled by a shadow which made him suspect an extension of the "growth" since the previous examination.

The third case was kindly referred to me by Dr. Rizer of Minneapolis. The patient, a girl of fifteen years, was first seen by me on September 17, 1929. She came with Dr. Rizer's diagnosis of a tumor in the left temporal area. X-ray films showed the tumor beautifully. The history was as follows: In May 1927 she began to have convulsive attacks. Even the first attack was severe with convulsions and unconsciousness. Since then many of the attacks had been milder. They appeared practically every day since May 1927, changing in severity. The attacks have always been preceded by a peculiar sensation in her tongue, which warns her to lie down. She has never bitten her tongue. Occasionally she foams at the mouth. She is never incontinent. The patient had been under the care of many doctors. Medication and diet relieved her somewhat. For the last two months she had had no medication and since then the attacks had come on at least once a day, often two and quite frequently three times daily, never more than four. The right side was always involved in the convulsions.

The general examination revealed nothing further. The patient was well developed and nourished. The pupils, eye movements and the fundi of both eyes were normal. Reflexes and position sense were normal. The

much jerking. The light attacks were over in a few seconds, while the severer ones were declared to last four or five minutes (?). During the lighter spells the patient heard what was going on, but not in the severer attacks.

The x-ray plates showed a central area of mottled appearance, apparently calcified, about the size of a silver dollar, though not circular but rather boggy in outline. Around this dense area one could recognize a less distinct zone of from a half to one and a half centimeters in thickness. The mass was located slightly below the middle between the base and dome of the skull and its center a trifle in front of a vertical line drawn through the meatus of the ear. On the plates made antero-posteriorly it reached from the bone, which is intact, to a depth of five and a quarter centimeters, reaching to within about two centimeters of the midline. The inner pole was three centimeters above the orbital roof, as seen in the frontal roentgenogram.

Operation, September 28, 1929, was performed entirely under local anesthesia. The patient had 1/6 gr. of morphin and 1/50 gr. of atropin beforehand. Towels were sewed to the area previously injected with 0.5 per cent novocain, outlining the field of operation. This suturing of the towels to the skin freed us from embarrassing flapping clamps. The patient was lying on the right side with the head supported beyond the table on an outrigger head rest. Heidenhain's interrupted stitches (catgut) were used for hemostasis on the outer side of the field and at the base of the flap, forming a complete circle.

The skin was incised inside the constricting hemo-

static sutures. The flap was a little larger than the palm of a man's hand. There was scarcely any bleeding; only three or four artery forceps were applied. The periosteum was freed inward and outward along the line of incision. With De Martel's cranial drill five holes are made and with the fraise (also of De Mar-

on. She then received a third hypodermic of 1/6 gr. of morphin and 1/150 gr. of atropin. Again the attack was warded off. After a short pause the dura could be stitched back into place, though the tension seemed too great to protect more than the posterior two-thirds of the exposed brain. Healthy brain was presenting in

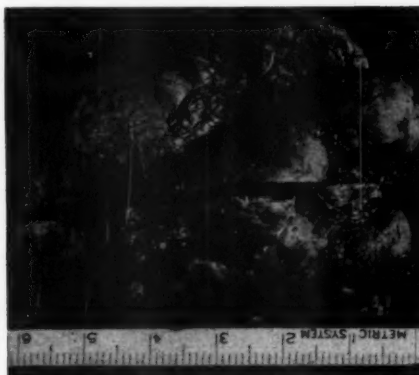


Fig. 15. Case 3. Calcified psammoma.

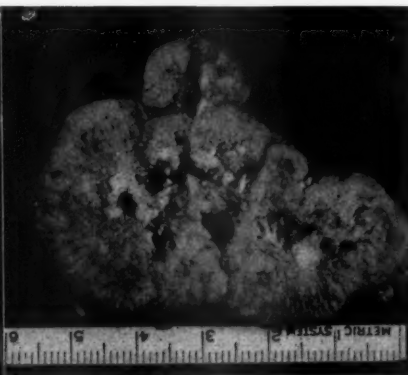


Fig. 16. Case 3. Psammoma; section through middle. Note areas of necrosis and liquefaction in central portions.

tel) the openings were united by cutting a channel about three millimeters wide. This apparatus worked admirably and saved much time. The flap was then broken out after a cut by a Doyen chisel on each side of the base. After raising the flap there was considerable bleeding from the very tense dura. This was checked by compression with an adrenalin-saline-soaked gauze sponge. Hardly any pulsation was felt.

Another hypodermic of 1/6 gr. of morphin and 1/150 gr. of atropin was now given, as the patient was afraid of an epileptic attack coming on. However, it did not develop and seemed to be warded off by the hypodermic and by patiently waiting. The dura was then cut, leaving a rather broad base for this flap postero-inferiorly. In the lower part of the wound a dark grayish area was noticed and the ordinary brain formation was not seen. There was some edema of the pia-arachnoid. On palpating the index finger entered between this tumor and the rounded stretched-out adjoining convolutions. Very gradually, in order not to damage the adjoining brain, we freed the tumor, which was much harder than the brain and was well outlined. The circumference of the tumor was greatest about one or one and a half centimeters inside the surface of the brain. Gradually the finger reached to a depth of about three or four centimeters. The tumor was smaller further in and it was possible to loosen it with the finger. Finally the tumor was rather readily lifted out. Only anteriorly did it seem that the adjoining parts were somewhat shreddy; they looked like bulky suffused pia-arachnoid. Bleeding was moderate and was controlled by a wet gauze pad held gently over the brain surface. The large size of the opening in the skull and dura undoubtedly helped in preventing damage to the brain.

The patient was again threatened with a convulsion. She screamed that she very distinctly felt its coming

the antero-superior part of the bone flap; however, it was protected by the uninjured lepto-meninges. The bone flap was fixed by three finest periosteum silk



Fig. 17. Case 3. Appearance of wound on day of discharge from hospital, sixteen days after operation.

sutures. Linen suture of galea and skin was used. The operation lasted one hour and forty-five minutes.

Before sewing up, the patient declared she had not had any pain during the operation. The last skin stitches were, however, felt.

The general condition of the patient at the end was remarkably good. Loss of blood amounted to between three and five ounces. Blood pressure at the end of operation was 111—82.

The weight of the tumor was 66 grams.

At the end of the operation the pulse was 140, but

patient was mentally much more dull than on the day before and seemed half dozing. The speech was indistinct and thick. On October 1st (three days after the operation) after a good night she seemed a little better. The right hand moved voluntarily but slowly and weakly. When asked if she had headache she

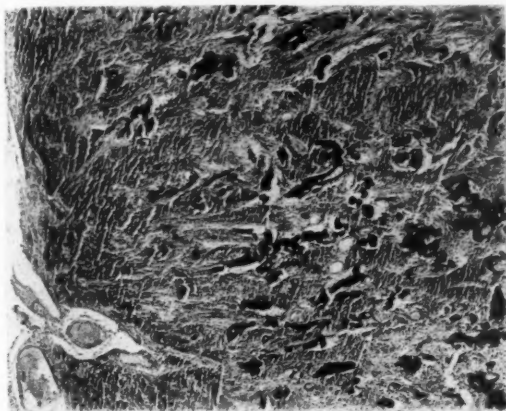


Fig. 18. Case 3. Low power. The black areas are the calcified psammomatous kernels.

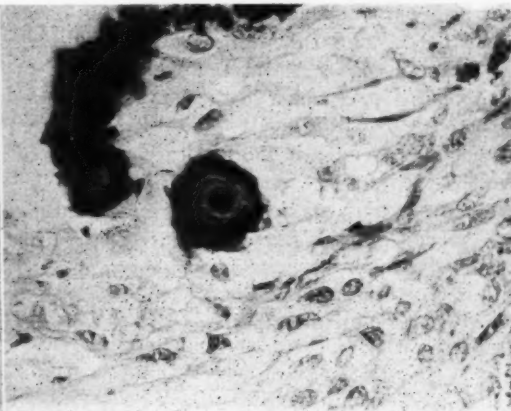


Fig. 19. Case 3. High power. Calcified amyloid body.

an hour later it had come down to 116 and was regular and strong. On the following morning it was 99. Before putting on the dressings, two of the Heidenhain stitches were removed to assure sufficient circulation. The others were left to be absorbed or cut later on.

The first few days the patient vomited a number of times and complained now and then of pain in the head. On several occasions she had a numbness in the right hand and arm. On the day after the operation she stated the right arm and hand and the right cheek had twice felt as if they were falling asleep. This was similar to her previous prodromal symptoms. It lasted two minutes and then was gone. These sensations of numbness had disappeared after three days. On September 29th (the day following the operation) we made the note that the patient was very bright. Her right grip was a little less powerful than her left, while the sensation was equal in both hands. The facial muscles acted normally; she could whistle; she had no headache when we visited her. Both feet moved normally. She was wide awake generally and when we were leaving she wanted us to have some of the fine fruit that had been brought her.\*

On September 30th, forty-eight hours after the operation, the right hand could hardly be closed and opened. There was no pain in it, while the day before it had hurt. The tongue felt numb and was sluggish. The

answered, "Just a little, less than yesterday." She was still dull and sleepy, though she asked for a magazine and looked at the pictures.

On October 2nd, the patient smiled, looked and felt much better. Power in closing left hand was 21 kilograms by dynamometer; in right hand 12.5 kilos (patient is right handed). Pupils were equal and reacted normally. She differentiated the sharp and dull end of a nail file very promptly on both hands; also heat and cold.

Four days later I find the note: "Olfactory, gustatory senses and hearing normal. Patient out of bed." At times the right, but mostly the left hand showed the more powerful grip.

While the patient had had four convulsions on the day preceding the operation, she has not had a single one since the operation (three months). A few hours after the operation the temperature had shot up to 103.2° and stayed rather high (ranging between 100° and 103°) for ten days till the sutures were all removed. The general condition was disproportionately good and the leukocyte count reached only once as high as 10,300, to recede two days later (October 9th) to 8,950, though even at this latter date the temperature reached 101.4°. The wound looked good, but there was oozing of cerebro-spinal fluid along some stitches. This may account for the apparently aseptic fever. Sixteen days after the operation the patient left the hospital in excellent spirits and the wound was healed as the photograph, taken on that day, shows. The right hand and fingers still felt a little numb on October 18th, but the patient was perfectly normal otherwise according to the members of the family.

Microscopically the tumor was a psammoma. Topographically the tumor apparently developed from the

\*This is mentioned as Hughlings Jackson (see Marion Hines "On Cerebral Localization" in "Physiological Reviews," edited by the American Physiological Society, July 1929) differentiates forms of speech: (1) voluntary or intellectual or propositional speech, which suffers most in cortical lesions; (2) emotional speech—ejaculations, swearing, which is more primitive and is unaffected by cortical lesions (the same words cannot be repeated after the emotion has passed); (3) what he calls "common speech," little sentences where (1) and (2) are interwoven. Pierre Marie considers the "center" of speech spread over a very large part of the lateral surface of the left hemisphere.



leptomeninges of the first temporal sulcus or possibly from the sylvian fissure.

#### SUMMARY

The three patients represent three very different lesions. The first one had a tumor of the cerebello-pontile angle. The second had an intracranial aneurysm of the left carotid artery directly above the optic chiasm and the third patient had a large psammoma in the left temporal region.

The improvement in the first case consisted of saving her vision, of mental restitution, of relief from nystagmus, ataxic gait, and of the paresis of the motor and sensory portions of her fifth nerve. This improvement had steadily progressed till now, two years after the operation.

In the second patient the remnant of eye sight,

which had not yet been destroyed by the optic atrophy, was preserved and the vision has even somewhat improved, enough so that she is again a useful member of her family. The pain in her face and head is relieved and the improvement is apparently permanent.

The third patient who suffered from daily epileptic attacks for two years and four months, is, so far, completely relieved and the outlook for the future is good.\*

All three cases were operated upon entirely under local anesthesia.

The reason for presenting these patients is to counteract the nihilism of despair which is found quite frequently among us and which has its disastrous effect in leading to procrastination.

\*Patient has not had an attack up to the time of proofreading of this paper, ten months following operation.

#### THE DEVELOPMENT OF PUBLIC HEALTH NURSING

At the invitation of the United States Public Health Service, Miss Ada Newman, of the Wisconsin State Board of Health, recently prepared a statement concerning the public health nursing movement. The following is a résumé of some of the outstanding points.

Growth of the public health nursing movement in the United States was at first very slow. With the development of preventive medicine, however, the demand arose for teachers who could spread the fundamental principles of disease prevention to parents, school children, teachers and employers. After 1905, growth became more rapid and at the beginning of the World War the pioneer stage drew to a close. Well-established organizations were to be found throughout the country and a growing consciousness of state and municipal responsibility was becoming manifest. It was then that the public health nurse came into the field as an active promoter of health measures.

It is obvious that hospital training alone does not qualify a nurse to meet the obligations of public service. To meet this need for more adequate preparation many of the leading universities are offering postgraduate courses to registered nurses who have sufficient academic background to enable them to matriculate.

Public health nurses are found in large numbers in the original task of caring for the sick in their own homes. These nurses are graduates of three-year hospital training courses and were either taught visiting

nursing by the staff school or took a postgraduate course.

The next largest service of the public health nurse is that of school nurse. She assists the health officer in communicable disease control, aids the school physician in examination of school children and makes home visits to interpret the findings and advice of the physicians to the parents.

Public health nursing is recognized not only from a humanitarian point of view and as an educational force but also on the basis of commercial value. This is demonstrated by the fact that business concerns employ nurses in large numbers, believing that, in order to have their plants operate on a more efficient basis, the health of the employees and of their families should be protected. Insurance companies also employ many nurses to work among their policy holders. When we consider that the only motive back of industrial nursing is a financial saving for the employing body, it speaks very highly for the economic value of such service.

The latest nursing activity to be developed in the United States is rural community nursing. These rural programs are planned to cover in part health educational work for the adult and for the school child, infant welfare, and the prevention of communicable diseases; in short, all phases of nursing service.

The demand for public health nurses greatly exceeds the supply. There are approximately 12,000 graduate nurses employed as full-time public health nurses in the United States at the present time. Many of them are doing pioneer work in rural communities and small cities and are carrying work sufficient for two or more nurses.—*Health News*, July 7, 1930.



## PERICARDITIS\*

T. A. PEPPARD, M.D.  
Minneapolis

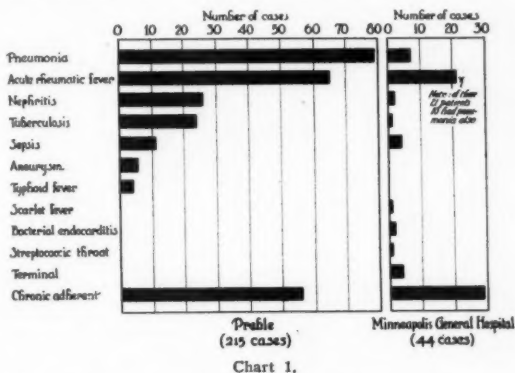
IN attempting to discuss a subject so familiar as inflammation of the pericardium, I do not desire to attempt a consideration of all of its various aspects. I do desire to emphasize certain diagnostic points, which seem to be of most value, and to call attention to certain errors and fallacies which, although they have been pointed out from time to time, still seem to persist.

For my purpose I shall cite personal experiences, and make reference to an unselected group of cases, compiled from the records of the Minneapolis General Hospital, during the past five years.

Sibson<sup>1</sup> presents an encyclopedic clinical discussion of pericarditis, as it occurred in his practice in St. Mary's Hospital, in London. Out of a total of 326 cases of acute rheumatic fever, sixty-three cases were affected with pericardial inflammation, fifty-four of which had endocarditis. Carefully analyzing the sex, age, and occupational factors, his tables show the two sexes affected in equal proportions below the age of twenty-one, while above the age of twenty-five males were affected three times more frequently than women.

In a group of 150 cases collected by Locke,<sup>2</sup> from 3,600 necropsy records at the Boston City Hospital, and in a series of seventy-eight cases, reported by Robey,<sup>3</sup> acute rheumatic fever was not an important etiological factor. This experience is in conflict with that of Sibson in whose series pericarditis occurred in approximately one-fifth of the reported cases. In seventeen of thirty-nine cases of acute fibrinous pericarditis, observed by Christian,<sup>4</sup> the pericardial inflammation accompanied or occurred just subsequent to the attack of acute rheumatic fever. Of Preble's<sup>5</sup> 244 cases of acute pericarditis, sixty-five occurred in relation to acute rheumatic infection. In addition to acute rheumatic fever, acute pericarditis is most commonly associated with pneumonia, local or general sepsis, and nephritis. Acute infections, such as diphtheria, scarlet fever, cerebro-spinal meningitis, erysipelas, are well known causes. Tuberculosis, occurring in

10 per cent of Preble's cases, occupied a more important place as a causative factor than in most other series. Then too it is observed as a terminal or coincidental event in cases of arteriosclerosis, hypertension, aneurysm of the aorta, mediastinal and lung tumors. Occasionally trauma is responsible for its occurrence.



From the records of the Minneapolis General Hospital during the past five years, there were found to be forty-four cases classed as acute pericarditis, most of which were seen by myself either on the medical service, or in consultation on some other service. In this group twenty-one occurred in relation to, or complicating acute rheumatic fever, or in a few instances rheumatic infection, such as acute tonsillitis, without the presence of swollen or enlarged joints. Seventeen of the patients had pneumonia, either bronchial or lobar, ten in association with their rheumatic infection, and in seven the pericarditis occurred as a complication of the pneumonia. In four cases the patients suffered from subacute bacterial endocarditis (one of these being a general septicemia associated with septic abortion). One case occurred as a complication of scarlet fever. One case was proven to be due to tuberculosis, and two complicated uremia. One case followed an acute streptococcal infection of the throat. Of the twenty-one rheumatic cases, twelve had a history of previous rheumatic infection, and also of these twenty-one cases, nineteen had evidence of mitral valve disease, either alone, or in association in 9 cases with aortic

\*Thesis presented before the Minnesota Academy of Medicine, March 12, 1930.

valve disease. One case of carcinoma of the lung had a large hemorrhagic effusion into the pericardial sac, although in this case the carcinoma had not invaded the pericardium, and the

occurs. Pericarditis following occlusion of the coronary arteries, strangely enough, was found to occur only once in this group.

It is perhaps surprising that subacute bacterial

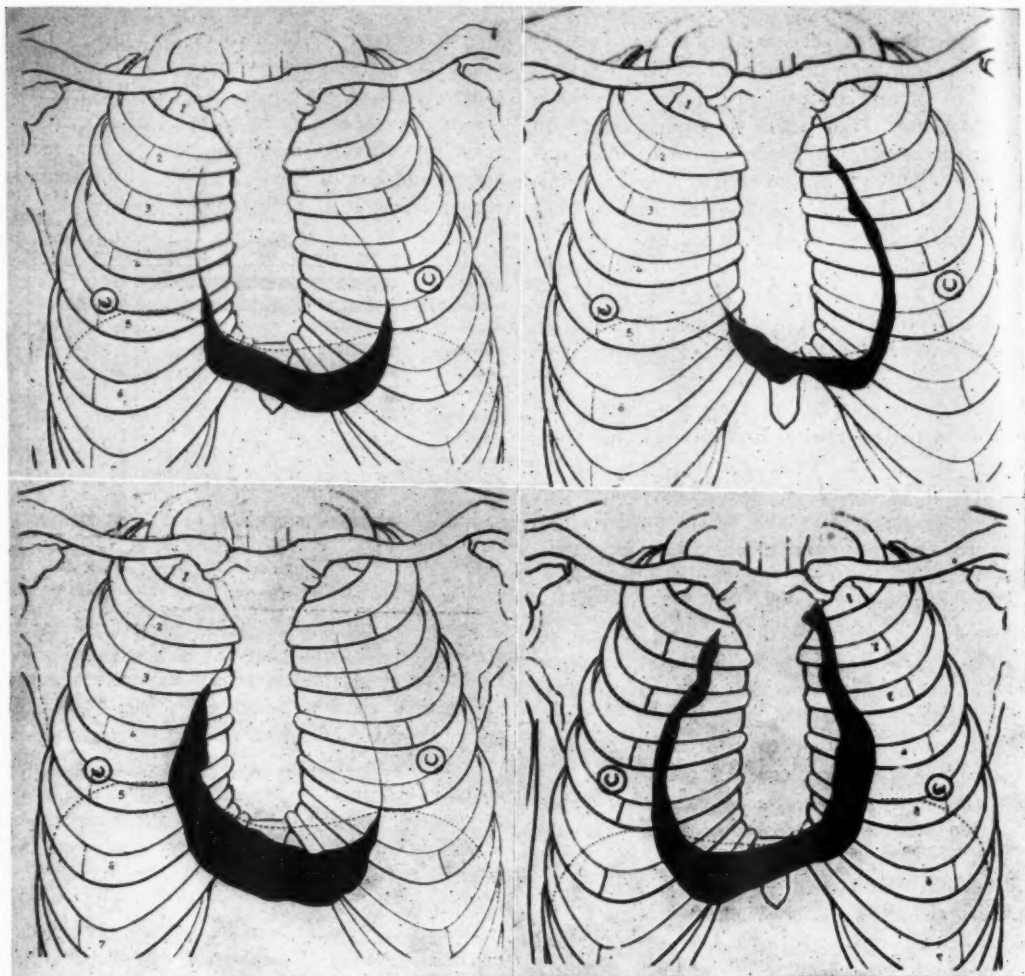


Fig. 1. Locations of accumulations of pericardial effusions. (Williamson.)

source of the hemorrhagic fluid was not apparent from the autopsy report. In three cases of hypertension with cardiac decompensation, as well as in one case of severe purulent bronchitis, the pericarditis developed as a terminal event. The diagnosis of pericardial infection was made clinically in all but five cases, either by the finding of definite pericardial friction rub, or the discovery of pericardial effusion, either by physical signs, or by the roentgen examination, or both. There were no cases caused by the gonoc-

endocarditis does not appear more prominently in a pathological relationship to pericarditis, for in the pathological studies made by Clausen and Bell,<sup>6</sup> pericarditis occurred practically as frequently in those diagnosed as subacute bacterial endocarditis, as in rheumatic fever.

The relation of acute fibrinous pericarditis, with or without effusion, to acute rheumatic fever, and to pneumonia and pleural infection, is so well known, and so well established, that it hardly seems necessary to discuss it at length.

The use of the term idiopathic to describe types of unknown etiology seems to be of no particular assistance in classification. Perhaps it would be better to classify this group bacteriologically and

absent, or may be of a very sharp, stabbing character. Usually it is felt over the heart, but it may radiate into the abdomen, to the left side of the neck and shoulder." MacKenzie<sup>8</sup> states "dry

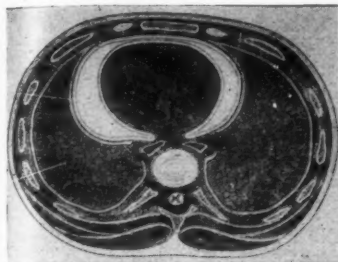


Fig. 2. Semidiagrammatic view of a transverse section of the thorax showing the disposition of the liquid in a small pericardial effusion. (From Curschmann.)

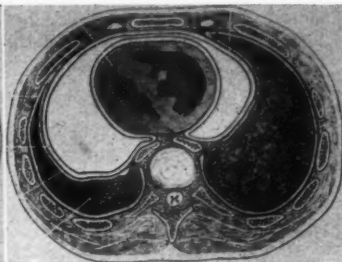


Fig. 3. Transverse section of the thorax (semidiagrammatic) showing the location of the liquid in pericarditis with moderate effusion. (From Curschmann.)

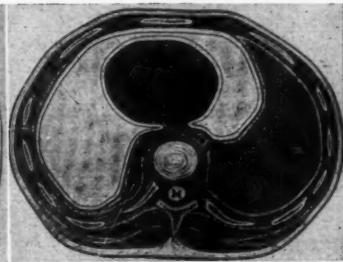


Fig. 4. Disposition of the liquid in a large pericardial effusion. Note the compressed left lung indicated as lying against the vertebral column. (From Curschmann.)

recognize that the path of invasion in these infrequent cases is not known. From a pathological standpoint subdivision may be made on the basis of the character of the exudate: fibrinous, sero-fibrinous, serous, fibrinopurulent, and purulent.

Necropsies were performed in nineteen instances. In the majority of these the exudate was characterized pathologically as fibrinous, serofibrinous, or fibrinopurulent. This exudate consisted of fresh, loose, strands of fibrin covering the pericardium in part or entirely. In eleven instances the amount of fluid was so small that the quantity was not estimated, and in two cases the loose fibrin was obviously purulent. In five other cases in association with fibrin there were amounts of fluid varying from 25 to 200 c.c., and in three the fluid was obviously purulent. In eight cases the accumulation of fluid only is mentioned, this being a clear, yellowish color, varying in amounts from 25 to 200 c.c. The 1000 c.c. accumulation of bloody fluid occurred in the case of primary lung carcinoma. The cases with the frank purulent exudate occurred in the cases of general septicemia, pneumonia, and in three instances, where the pericardial inflammation was a terminal event. In a few cases there were found old adhesions side by side with acute inflammation.

Nearly all authors comment on pain as a symptom of pericarditis, although their statements indicate that this is a variable factor. Norris and Landis<sup>7</sup> assert "Pain may be entirely

pericarditis is essentially a painless complaint. This curious painlessness has long puzzled me. When pains are associated with pericarditis it will invariably be found that there is evidence of myocardial affection." McPhedran<sup>9</sup> says that pain is generally present. Sibson<sup>1</sup> found it in 70 per cent of his cases. Schroetter<sup>10</sup> states that the greater number of cases occur without pain. Poynton<sup>11</sup> says that it may occur with little discomfort, and no pain. Babcock<sup>12</sup> found pain in the majority of his cases, or at least a sense of distress. Blumer<sup>13</sup> states that pericarditis is often almost without pain. Billings<sup>14</sup> does not mention pain in his text, and in only one case history. In seventy-eight cases in Robey's<sup>3</sup> series pain was not a striking feature, and was observed twenty-six times. In seventeen of the twenty-six cases there was either acute pneumonia or disease of the pleura, in two others chronic disease of the myocardium, and in one aneurysm of the arch of the aorta, leaving but six cases out of the twenty-six with pain directly over the precordium. In the two cases of purulent pericarditis pain was not observed at any time. Robey observes that a good many patients with acute disease of the heart, while they do not have actual pain in the heart, generally say that local applications of ice make them feel more comfortable. Albutt states that there are cases in which the pain is like that of angina pectoris.

From a clinical and experimental study Capps<sup>15</sup> concluded that stimulation of the lateral walls of

the pericardium did not produce pain. Puncture of the pericardium at the level of the fifth and sixth interspaces produced phrenic nerve pain. Puncture at the level of the fourth interspace

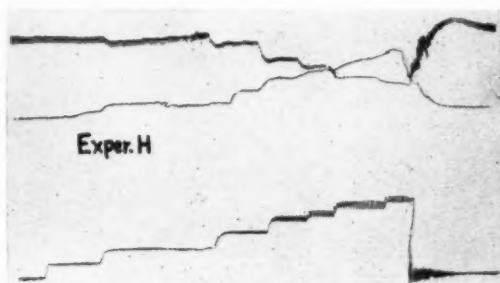


Fig. 5. Tracing showing the effect of increasing intra-pericardial pressure upon arterial and venous pressures. (Williamson-Ets.)

did not cause pain. He infers that the phrenic nerve supplies the central diaphragm and at least the lower portion of the fibrous pericardium. He believes the presence of pain in pericarditis usually indicates involvement of the tissues outside of the pericardium, especially the pleura.

In six of the present group of cases, no pain was complained of; in seven the patients complained of abdominal pain; and in three of these it was localized to the epigastrium. In the others it was spoken of as diffuse, more often of a dull rather than severe character. In the remaining cases chest pain was complained of, in eight of these characterized as precordial, in a number of others being mentioned only as left sided pain. In two instances it was complained of as being substernal. In one instance it occurred in the region of the left scapula. This varied from severe, sharp, lancinating pain to a dull sense of pressure or only a soreness. It is often increased by movement, deep breathing or coughing. Not infrequently patients were observed leaning far forward in bed, a posture which has been described as characteristic. In some instances pressure over the precordium aggravated the symptom, and tenderness was elicited. A finding mentioned in only two of the records, but which, from my experience, I am inclined to believe occurs more often than it is looked for, is hyperesthesia over the precordium.

My own experience leads me to believe that pain of some type is met with as a symptom in patients who have pericarditis. I believe that

sharp and severe pains, stabbing in character, are more often associated with pleurisy, rather than its being due to the involvement of the pericardium itself. Certainly in the majority of the rheumatic cases where pleurisy is not a factor, as well as those cases occurring as a late complication of pneumonia (in these the manifestation of the acute pleuritis having subsided), the complication is either attended by no pain whatever, or else a sense of precordial discomfort or oppression. In certain instances the pain, if present, or the discomfort may be aggravated by pressure or definite tenderness may be elicited over the precordium.

Dyspnea is not infrequent although it may not appear until in an advanced stage of the disease, and more often than not is the circumstance one of increased rapidity of breathing rather than any marked subjective discomfort.

Dysphagia was not observed in any of the present series of cases. Sibson<sup>1</sup> mentioned difficulty in swallowing in thirteen cases. In none of the present series was loss of voice observed, although in a few the voice was husky and this may have been due to affection of the left recurrent laryngeal nerve.

Coma and delirium, commented upon at length by Sibson, only occurred in the present series of cases when they could be readily accounted for by the toxemia and hyperpyrexia.

The outstanding physical sign and the one which is most diagnostic is the pericardial friction rub. As a rule this was identified with the greatest of ease, being characteristically to and fro, being heard toward the base of the heart, the apex, or over the entire precordium. The quality of the sound varied very greatly from a fine rather high pitched, not necessarily intense, and of a grating character, to the very loud, harsh, leathery rub which occasionally may be detected on palpation, as friction fremitus. In one case of infarction, due to coronary thrombosis, the rub easily distinguishable as such, varied markedly from time to time, occasionally being very definite, and at other times hardly audible. After several days, in this particular instance, the sound became very soft and distant, and could easily have been mistaken for a soft blowing murmur. Although many authors have repeatedly commented upon the error, it still seems to be a prevalent idea that the accumulation of fluid within the pericardial sac necessarily causes



a disappearance of the friction sound. I have repeatedly carefully examined, day by day, patients showing a pericardial friction rub, the friction rub persisting at each examination while at the

and in such a condition signs may be accounted for in quite the usual manner. It might be of interest to comment here upon Connor's belief that the compressed lung in large pericardial ef-

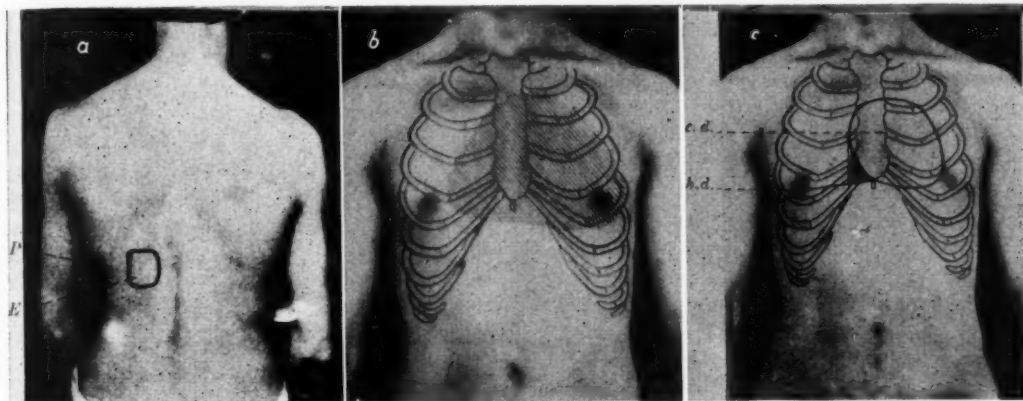


Fig. 6. Physical signs of pericardial effusion. (Babcock.) a. Location of pulmonary changes in Pins' (P) and Ewart's (E) signs of pericardial effusion. b. Apex beat and area of cardiac dullness in case of pericarditis with effusion. c. Rotch's sign of beginning pericardial effusion—dullness in shaded area or cardio-hepatic angle: c. d., cardiac dullness; h. d., hepatic dullness.

same time noting the widening of the percussion borders, and by roentgen examination have shown that fluid was accumulating within the sac. Williamson<sup>16</sup> states that the friction rub not only may, but does persist with large effusions in two-thirds of the cases. He believes that this is due to a large heart. Conner<sup>17</sup> comments upon the persistence of the pericardial friction murmur during an effusion.

Ewart<sup>18</sup> and later Christian<sup>19</sup> have called attention to the frequency of the so-called pulmonary compression signs, occurring over the left chest posteriorly. Ewart mentions the area of dullness with tubular breathing and egophony occurring near the angle of the scapula. The area may be small or large. Christian calls attention to the fact that these signs may be demonstrated even when there is little or no demonstrable fluid present in the pericardium. Christian attributed this sign to atelectasis. He mentioned, however, the possibility of the presence of a pleural effusion as well as pulmonary infection, which often occurs, and which might confuse one in this interpretation. Inasmuch as these posterior signs are present with quite small, as well as larger effusion, I believe that the percussion findings may be accounted for in the same way as Skodas tympany is accounted for in other situations. I believe, however, that with very large effusions, atelectasis is brought about,

fusions lies not against the vertebral column, but against the ribs, in the region corresponding to the posterior part of the axilla. He says that it is difficult for him to see how the compressed lung can ever lie against the vertebræ, for as the pericardial pouch enlarges and begins, below the root of the lung, to extend backward along the side of the bodies of the vertebræ, it must, it would seem, work its way between the vertebræ and the inner surface of the lung. With effusions of considerable size, prominence of the precordium may be observed in children, though rarely in adults. Various percussion signs have been described; some of them obviously are of great diagnostic importance. Morris and Bader<sup>20</sup> state that 250 c.c. of fluid in the pericardial sac is often sufficient to be demonstrated by percussion. Widening of the area of dullness, and widening of the roentgen shadow in the first and second interspaces occurs relatively early, and is best determined with the patient in the recumbent posture. Narrowing of this dull area, with a corresponding decrease of the shadow over the great vessels, when the patient is changed from the recumbent to the erect posture, is considered a most reliable sign of fluid in the pericardium. Rotch's<sup>21</sup> name attaches to a percussion sign which he considered diagnostic of pericardial effusion. This was the absence of resonance in the fifth right intercostal space. Hess<sup>22</sup> advo-



cated auscultatory percussion as a means of diagnosis in pericardial effusion. Dullness over Traube's space may be obtained.

Williamson<sup>23</sup> injected the pericardium with glycerin and agar and made casts. He shows that the fluid accumulates first in the lower portion of the pericardium, and that moderate amounts (500 c.c.) of effusions will serve to push down the left lobe of the liver. Evart<sup>24</sup> in his twelve diagnostic points mentions depression of the liver, as one of the signs of pericardial effusion. Williamson, by his injection method with small and medium amounts of fluid (350-600 c.c.) was unable to satisfactorily demonstrate Rotch's<sup>21</sup> sign, nor the sign described by Ebstein,<sup>25</sup> that is, a rounding of the cardiac hepatic angle. Williamson stated that the behavior of the fluid was independent of the position of the patient, and from his experiments concluded that the best location to reach a small amount of fluid with the exploring needle was either just outside the apex or in the chondroziphoid angle (Marfan's point). Various authors have different choices as to the most desirable point of inserting a needle, or doing a paracentesis. Pendlebury<sup>26</sup> states that this is best done in the fifth left intercostal space, one inch from the margin of the sternum. Connor states<sup>17</sup> that the needle should be inserted either at a point well to the left and below the position of the apex beat, or over the area of flatness posteriorly. He prefers the posterior tap, as being the simplest and safest. I have aspirated at this site, and also in the fourth and fifth interspaces, just to the right of the sternum. Williamson and Ets<sup>27</sup> make a plea for not delaying aspiration too long. They state that a not inconsiderable number of patients, with uncomplicated pericarditis with effusion die as a result of pressure from the exudate mechanically shutting off the great veins. This danger is not necessarily proportionate to the size of the exudate, but rather to the rapidity with which the effusion develops. A steady fall in the arterial pressure, and particularly a sudden increase in the rate of fall is a direct indication for therapeutic puncture. In supporting their contention they performed the following interesting experiment. To determine the relation between arterial, venous, and intra-pericardial pressures—with cannulas inserted into the carotid artery and jugular vein, to record the arterial and venous pressures, they inserted a cannula into

the pericardium and injected physiological salt solution. The pressure within the pericardium was gradually raised until the heart stopped beating. The increase in pericardial pressure caused a steady rise in the venous and a steady fall in the arterial pressure. In my experience, it has seldom been necessary to do paracentesis in rheumatic pericardial effusions.

In 1873 Kussmaul<sup>28</sup> described as a characteristic symptom of the obliteration of the pericardium, change in the arterial pulse, it becoming smaller or disappearing entirely on inspiration, and returning to normal on expiration, so-called pulsus paradoxus. Gauchat and Katz<sup>29</sup> described a case of pericardial effusion, which brought about this change in the pulse, and noted that the abnormality disappeared after pericardial paracentesis.

Following the suggestion of Wenckebach,<sup>30</sup> injections of air into the pericardium following aspiration has been done with the idea of preventing formation of adhesions. Troisier, Jacquelin, Gayet<sup>31</sup> and Castex<sup>32</sup> report cases treated in this manner. One case of tuberculous pericarditis, with a large effusion, has come under my observation, which had pneumopericardium performed. The procedure, no doubt, will not have widespread application.

There has been much discussion and comment as to whether the heart is displaced in event of the accumulation of pericardial effusions. Calvert<sup>33</sup> states that the position of the heart in pericarditis depends upon the size of the heart, and that the size in turn is dependent upon the degree of distention or amount of blood within the heart. While compensation is maintained the heart contains a relatively normal amount of blood, and is in a relatively normal position. When compensation fails the amount of blood delivered to the heart is diminished. The heart becomes smaller and smaller until collapsed, the size of the heart varying inversely as the pericardial pressure. The apex is in the normal position, or displaced slightly backward or to the right.

Nephritic and uremic states frequently have associated pericarditis. Bright<sup>34</sup> reported an incidence of 8 per cent, Sibson the same, Preble and Barach<sup>35</sup> each 11 per cent in 300 and 162 cases respectively. At autopsy little fluid is found as a rule, but usually there is a thick bread-and-butter-like exudate, covering the entire precordial

surface. In only four of Barach's cases did the culture show pyogenic organisms, and in these cases the inflammatory reaction was of the polymorphonuclear type. In the cases in which no

lieves that this is due to compressive effect of the pericardial effusion upon the coronary circulation. The contention that low wave amplitude might be considered evidence of pericardial

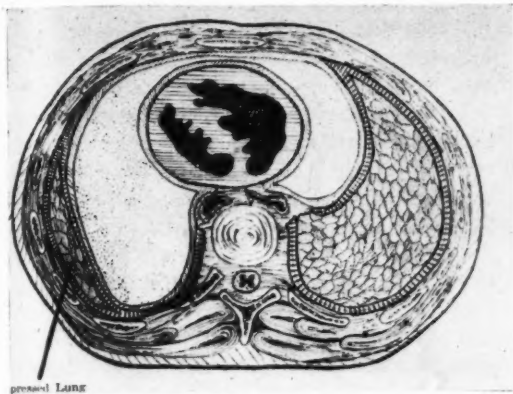


Fig. 7. Semidiagrammatic section illustrating author's view as to the usual position of the compressed left lung in the presence of a large pericardial effusion.

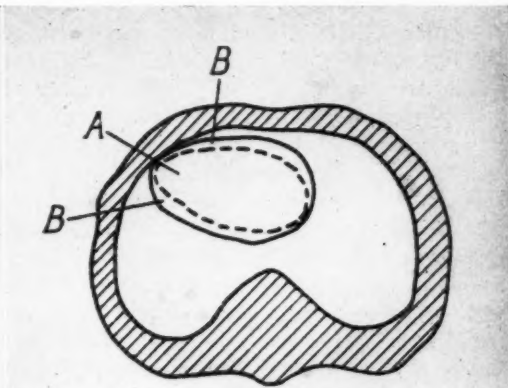


Fig. 8. Cross section of thoracic wall and of heart. Dotted line = size during systole. (Connor.)

growths were obtained the reaction was of the mononuclear type. In 90 per cent of Barach's reported cases the diagnosis was made by the presence of a friction rub. The average length of life after the appearance of the rub was twenty-nine days, although one patient lived as long as one year. In one case, under my observation, the friction rub was observed in September, and the patient did not succumb until the following March. The immediate cause of death in this case was pneumonia.

Attempts have been made to identify conduction changes which might be considered as an aid in the diagnosis of pericardial effusion. Oppenheimer and Mann<sup>36</sup> found electrocardiographs of low voltage associated with large effusions. These were not necessarily associated with change in shape, although it is conceivable that the effusion may alter the electrical axis in some cases, or cause other changes in the propagation of the electrical impulse. Large effusions may fail to effect the voltage appreciably in certain cases. Gauger<sup>37</sup> pointed out the effects of increasing intra-pericardial pressure on systemic blood pressure, as shown by Lewis<sup>38</sup> and refers to investigations by Kuno<sup>39</sup> who showed that the circulation ceased when the intra-pericardial pressure equalled the venous pressure. He reports a case of auriculo-ventricular block accompanying a large pericardial effusion, and shows tracings after paracentesis which were normal. He be-

lieves that this is due to compressive effect of the pericardial effusion upon the coronary circulation. The contention that low wave amplitude might be considered evidence of pericardial

#### ADHERENT PERICARDIUM

Discovery of adherent pericardium during life is in many cases impossible, and in some doubtful or difficult. When the adhesions are partial, when the heart is small or when the relation between the heart and lungs is undisturbed, the diagnosis at best is doubtful, and if made rests upon speculation only. Vaquez<sup>40</sup> states that where layers of pericardium are simply adherent the condition is often unrecognized and is relatively benign. When, however, in association with the adhesion of the two layers of the pericardium, one to the other, adhesions are also present to the neighboring structures, the heart becomes immobilized in the chest and will have its function materially interfered with, decompensation eventually resulting. Just as acute pericarditis has many and varied causes, so the result, adherent pericardium, has the same causative factors, namely, the infectious diseases, pneumonia, scarlet fever, rheumatic infections, tuberculosis, nephritis, malignant disease, and occurs in association with, and as a result of such conditions as aneurysm and mediastinal tumors. The adhesions may be partial or com-

plete, varying greatly in extent and consistency. Partial adhesions take place most frequently near the apex and along the line of the ventricular septum, and the outer side of the right auricle, also about the base of the heart in the region of the great vessels; in short, where the extent of the movement of the heart is least. Adherent pericardium is one of the frequent causes of enlargement of the heart. Sibson compared a group of cases of valvular disease, in which the pericardium was adherent, with the same type of cases in which the pericardium was not adherent. The weight of the heart in cases of valvular disease with adherent pericardium (13 cases) averaged 120 grams, larger than those hearts with valvular disease, but without adherent pericardium (63 cases). Head<sup>41</sup> studied fifty-five cases of chronic adherent pericarditis, all of which were verified by post-mortem examination. He subdivides his cases into three groups: first the silent group (five cases), there being no subjective or objective symptoms, and the true nature of the disease being discovered only at autopsy. In his second group (67 per cent) the symptoms and physical signs pointed to a disturbance of the circulation, and congestive failure was the outstanding feature. His third group (eleven cases) were those commonly known as Pick's disease, the symptoms and signs of this group suggesting cirrhosis of the liver. Pick<sup>42</sup> sums up the results of his observations as follows: "There is a symptom complex which is deceptively similar to the mixed forms of cirrhosis (with swollen liver, marked ascites, but without icterus) and which is due to the fact that the circulatory disturbances caused by a latent pericarditis lead to proliferation in the connective tissue in the liver, and having, as a result, through stoppage of circulation in the portal vein, very highgrade ascites. This condition occurs generally in young individuals, but it is also observed in later years. The following points are guides in the differential diagnosis; the failure of the etiological factor for cirrhosis of the liver; the anamnestic report of previous pericarditis and previous edema of the legs. Systematic examination of the heart can alone lead to a trustworthy result."

*Discussion of Cases.* Twenty-eight cases were classed as adherent pericarditis. In reviewing the records, it was believed that from the recorded data in eight cases there was insufficient

evidence at hand to properly make such a diagnosis. Of the twenty cases, thirteen had definite history of previous rheumatic infection. In most of these, this was a true rheumatic fever, although in the case of two or three, repeated attacks of tonsillitis or attacks of chorea were included. Of the remaining seven cases one was associated with syphilitic aneurysm of the aorta, one was associated with chronic pulmonary tuberculosis, and a third had had an occlusion of the coronary artery. One of the patients who had a history of previous rheumatic infection, but had no evidence of endocarditis, suffered from congestive failure, which was the result of an essential hypertension. This patient's history included a previous hospital admission, when he had suffered from an acute pericarditis. Sixteen were considered to have definite evidence of valvular disease, either mitral or aortic involvement, or both. Eleven cases had rather definite congestive heart failure of varying degrees.

Enlargement of the heart is an almost invariable accompaniment of adherent pericarditis, and is of such frequency as to make difficult the drawing of hard and fixed lines of differentiation. The latter lesion undoubtedly produces cardiac hypertrophy, and subsequently dilatation. Some of the largest hearts, met with at the necropsy table, can be accounted for in this way.

In cases of adherent pericardium retraction of the lower ribs opposite the attachment of the diaphragm on the lateral or posterior aspect of the thorax may sometimes be seen. This sign, to which Broadbent's name is attached, was considered by him, and is probably still to be considered a most important finding, when present. This phenomenon is best seen when the patient is sitting in a good light, the thorax being inspected tangentially from behind, and is more often seen on the left side. It may also be observed on the right, and when so observed is of even greater importance. It is more marked when deep inspiration is made. Broadbent<sup>43</sup> says: "Here, it is not possible that the heart can be directly fixed to the chest wall, at the points of retraction by pericardial adhesions, as the lung tissue intervenes; but the explanation seems to be the following: The heart is, by means of the pericardium, adherent not only to the central tendon of the diaphragm but probably also to a large area of the fleshy or muscular portion of the diaphragm, and it may be, to the anterior thoracic

wall as well. As it contracts it drags upwards and inwards the less resistant fleshy part of the diaphragm towards the central tendon or anterior chest wall; hence the points of attachment of the digitations of the diaphragm to the lower ribs and costal cartilages are dragged inwards and downwards."

While commenting on the important significance of this sign, I need to specify that it is not pathognomonic. In five autopsies on patients with adherent pericardium, in the present series, Broadbent's sign was observed and recorded in only one. Also I might mention a patient with tremendous cardiac hypertrophy, the result of a long standing hypertension, in which systolic retraction was seen during life on both the left and right sides posteriorly. The necropsy did not show any involvement of the pericardium or surrounding structures.

The pulsus paradoxus of Kussmaul<sup>27</sup> previously referred to, may be considered one of the important signs, which may occur as a result of an adherent pericardium. Kussmaul explained his conception in the following way: "Pericardium thickened, partly by callous membrane and fibrinous growth, inside as well as out, partly through increased thickening of its fibrinous layers, causing a definite inclination to obliterate the cavity. In the mediastinum it produces a callous skein and compact threads, which extend upward from the pericardium to the arch of the aorta, innominate vein, surrounding the stem of these vessels, drawing, kinking, and twisting them, binding the arch against the pericardium, and joining the vessels directly to the upper part of the breast bone. The pulse in all of the arteries will be small or disappear entirely during inspiration, and return to normal during expiration. The veins in the neck, especially the bulb of the jugular vein, will be swollen during inspiration." Kussmaul further cautions that a paradoxical pulse can occur in other conditions found in the mediastinum, and that a careful consideration of the symptoms and physical signs, as well as history, must be considered before making a diagnosis of mediastino-pericarditis.

Gauchat and Katz, already referred to, considered in two papers the causes of pulsus paradoxus. They considered the occurrence of this phenomenon and abnormality of the respiratory tract, and believe it to be produced by modifications of the intrapleural pressure. They experi-

mentally showed that adhesions need not be attached to any particular vessel, but may be fastened anywhere between cardiac structures, and thoracic parietes, and still be capable of pro-

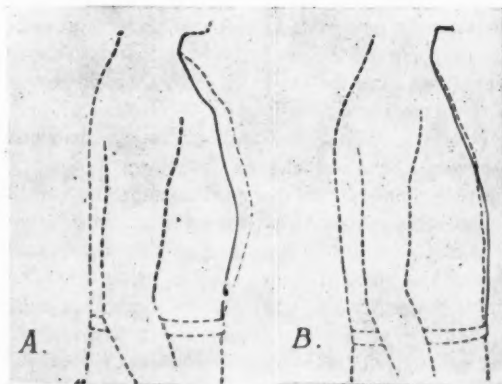


Fig. 9. a. Normal respiratory profile. Solid line, deep expiration; dotted line, deep inspiration. b. Wenckebach's crossed profile.

ducing pulsus paradoxus. Mechanical compression of the aorta produces an immediate effect upon the amplitude of the pulse. Compression of the pulmonary veins caused a decrease in pulse amplitude after one or two beats, and compression of the vena cava had the same effect after three or four beats.

All of the signs advanced as indications of adherent pericardium, Skoda's<sup>44</sup> "dimpling," retractions of the chest anteriorly and posteriorly, retraction of the epigastrium, percussion changes obtained with the patient in various postures and during various stages of respiration, the extent of the absolute dullness and its relation to the superficial dullness, Wenckebach's crossed respiratory profile, are not pathognomonic. The character of the apex beat, and the diastolic shock are of doubtful significance. Abnormal filling of the neck veins, and their diastolic collapse, and dilated veins over the anterior thorax may be significant in indicating some interference with venous return.

A means of investigation which may prove to be of considerable help is the electrocardiograph. Dieuade<sup>45</sup> studied a small series of patients in this way. Normally there is a change in the form and amplitude of the electrocardiographic waves on shifting the subject from the right side to the left side. This change is due to a rotation of the heart, and consequently there is a change



in the electrical axis. It is marked in most patients with heart disease, and cardiac enlargement does not prevent the usual change. A small series of patients were shown to have no significant change in their electrocardiographic record with a shift in position. All of these who came to necropsy were found to have important lesions involving both the pericardium and mediastinum. Of a larger series of patients with clinical signs of adherent pericardium, whose records all showed a marked change, none were found to have lesions both of the pericardium and of the mediastinum. It is suggested that fixation of the electrical axis determined by this means may serve as objective evidence of a lesion involving both the pericardial cavity and the mediastinum.

Surgical attempts at freeing the heart so handicapped by adhesions have become more frequent since the advice and communications of DeLorme in 1898 and Brauer in 1902. The procedure advocated by Brauer is the one more frequently employed, rather than the more formidable manipulation of DeLorme, which involved forcible breaking up of adhesions present. In brief the operative procedure consists in removing portions of those ribs to which the pericardium is adherent. As a rule portions of the third, fourth and fifth costal cartilages are removed, with their anterior periosteum, in such a way as to make the chest wall more mobile. Bourne<sup>46</sup> reports twenty-five cases of cardiolysis, and from a consideration of the case histories and results obtained his enthusiasm seems justified. He states that its efficacy in severe heart failure is apparent, and the operation logically should be performed in failure of lesser degree, due to adherent pericardium. The chief indication for the operation is heart failure of whatever degree accompanied by adherent pericardium. The chief contraindication to the operation is the presence of some severe, progressive rheumatic lesion, such as advanced mitral stenosis.

One patient of the present series was subjected to this operation, and the results obtained surely justified the procedure. This patient, a young man of twenty-five, had been under observation over a period of two years, and during several hospital admissions. Acquiescence to the advice for surgical interference was postponed for many months, and the operation was performed only after the patient had been confined to bed with congestive failure for a period of

three months, without improvement. Subsequent to the operation the patient was relieved from the substernal distress, dyspnea, and palpitation from which he suffered, and he was then able to be up and about for a period of six months prior to his death from heart failure. We have always regretted that this patient did not submit to operation when he was first advised of its desirability.

#### CONCLUSIONS

Acute fibrinous pericarditis is not difficult of diagnosis, pericardial friction being its most significant symptom.

Pericardial effusion is not difficult of diagnosis, provided that the patient is followed from day to day with careful physical examination.

The presence of a pericardial effusion does not preclude the hearing of a pericardial friction rub.

Most pericardial effusions caused by rheumatic infection do not require paracentesis.

Adherent pericardium presents greater difficulties of diagnosis and there are no signs which can be considered pathognomonic.

Of the valuable signs, that described by Broadbent is most suggestive, especially when its occurrence is noted on the right side.

As a palliative measure the operation of cardiolysis is of considerable value, and should be recommended more frequently.

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#### ACCEPTED AND NONACCEPTED VIOSTEROL PREPARATIONS

When the question of accepting preparations of irradiated ergosterol arose, the Council on Pharmacy and Chemistry adopted a common name, viosterol, for this product. This name is not protected by trademark or copyright. It appears to have been generally adopted and is used by all manufacturers whose products have been accepted by the Council, with modifications to indicate composition and strength in vitamin D, as viosterol in oil 100 D and cod liver oil with viosterol 5 D. These products are all required to be physiologically standardized according to the method given in New and Non-official Remedies and may be relied on to have the composition and antirachitic strength claimed on the label. Therapeutic claims other than those permitted by the Council are not made for them. While it is desirable that the short, concise descriptive name viosterol be generally adopted to designate irradiated (activated) ergosterol, there is a danger that it may be used in connection with some preparations in such a way as to give the impression that a product that has not been considered or accepted is one of those accepted for inclusion in New and Non-official Remedies. In order not to waste his time and his patient's money (or worse) by using a product of unknown strength or composition, the physician should make certain that it has been accepted by the Council on Pharmacy and Chemistry. This can be determined by a statement to that effect on the label of the product, by the occurrence on the label or package of the seal which the Council permits manufacturers of accepted products to use, or by direct inquiry to the American Medical Association. (*Jour. A. M. A.*, June 14, 1930, p. 1923.)

#### TOBACCO ADVERTISING GONE MAD

The modern tendency for advertisers of all kinds of merchandise to drag the health angle into their advertisements is one of the most disturbing features in the modern advertising field. The medal for the most horrible example would seem to go to the American Tobacco Company in the exploitation of Lucky Strike Cigarets and Cremo Cigars. The exploiters of Lucky Strike Cigarets have claimed that 18,000 physicians have testified that "the heat treatment, or toasting process, applied to tobacco previously aged and cured" is likely to free the cigaret "from irritation to the throat." There was also started a campaign, "Reach for a Lucky instead of a Sweet," in which—either directly or by implication—young women were urged to smoke Lucky Strike Cigarets when they had a desire to eat candy, or pastry. Another branch of the American Tobacco Company's business has been carrying on an advertising campaign for "Cremo" cigars in which the public is led to believe that most cigars are handmade and have their tips finished off with the saliva of the individual workman. Physicians will readily admit that many young women eat more candy than is good for them, but they will certainly not agree that the substitution of cigarets in such cases is in the interest of public health. Physicians may also admit that, theoretically, it is possible for disease to be transmitted by means of cigars. But when one considers the millions of cigars that are consumed annually and that it is extremely difficult to find in medical literature any real evidence of the transmission of pathologic bacteria by means of cigars, the campaign of the Cremo concern stands condemned. (*Jour. A. M. A.*, March 15, 1930, p. 810.)

## FIRST INFECTION BY THE TUBERCLE BACILLUS\*

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*Saint Paul*

IN THIS discussion, first infection with tuberculosis is considered the entrance of tubercle bacilli into the body in sufficient numbers to produce a positive tuberculin test. X-ray evidence may or may not be present. Recovery may ensue or death may follow. Reinfection is considered the entrance of tubercle bacilli into a body that has developed the response shown by a positive tuberculin test.

My purpose is to bring forth the latest opinions as to whether first infection leaves an asset or a liability to the body in our present civilization; whether it protects against progressive tuberculosis or whether susceptibility is increased. In dealing with this question, certain premises must be assumed.

1. For purposes of our study, it must be accepted that the immunity phenomenon in rabbits or guinea pigs is fundamentally the same as in humans. Injection of tubercle bacilli into these experimental animals produces tubercles as in humans and as far as we know the body's method of resisting is comparatively the same. The immune mechanism in the two is the same, but the capacity or power to respond may vary.

2. We must agree that dosage is one of the most important factors in establishing the presence of lesions both in the infected and non-infected body. In comparing, therefore, the difference in resistance of the non-infected and infected organism, we must assume that equal doses of tubercle bacilli are being given.

3. It must be accepted that many first infections as well as reinfections occur without any noticeable symptoms.

In our work with the human family, we are handicapped in this study by the following factors:

1. Our inability to measure the dose of tubercle bacilli entering the body.

2. Lack of knowledge as to the number of inoculations received and their time intervals.

3. Insufficient control over those being observed. Some will observe with great care and

diligence the rules of life laid down as to rest, diet and freedom from strain, while others will carry heedlessly on as before, their chief co-operation being to return for further examinations. The tuberculous process will surely behave differently in these two types.

The behavior of first infection and reinfection has been a study ever since the days of Dr. Robert Koch who first reported on the variation in response of animals inoculated with tubercle bacilli the first time and succeeding times. He showed that a given inoculation of virulent tubercle bacilli into a non-infected animal would leave an apparently healed wound until the tenth or fifteenth day when deep ulceration would occur and the wound would discharge until death followed in a few weeks. A similar inoculation into an animal that had recovered four to six weeks before from a sublethal dose, produced within the next two days an indurated area resulting in a superficial ulceration which in turn rapidly healed. The neighboring lymph glands did not become involved in the latter instance. The bacilli were kept localized and were prevented from wide dissemination throughout the body. The body, in other words, resisted the invasion. This peculiar response of a previously infected animal to reinfection was called the Phenomenon of Koch. Later investigators hastened to repeat this experiment, but failed to produce the same phenomenon. Further work showed that their failure was due to too severe initial infections and not giving ample time for the body to develop sufficient immune reactions. It was found that in a too severely infected animal even a small second dose of bacilli would produce a fatal tuberculin intoxication. When this fact became recognized, however, and when proper initial doses were given followed, in the case of the guinea pig, by at least a fifteen day interval before subsequent inoculations, the phenomenon of Koch was then observed. Proper doses and proper time intervals between inoculations, therefore, were found to be necessary for the establishment of a relative state of immunity.

\*Presented before the Trudeau Medical Society at Pokegama Sanatorium, June 7, 1930.

This work on the laboratory animal stood without question to be equally true of the human family until recently when the results of tuberculin tests supported by *x*-rays in children attracted such widespread attention. The work of Opie,<sup>1</sup> McPhedren,<sup>1</sup> Myers,<sup>2</sup> Chadwick,<sup>3</sup> Rathbun<sup>4</sup> and many others impressed us with the great prevalence of tuberculous infection in children and showed that first infections, which look so forbidding on the *x*-ray film, in most cases lead to an uneventful recovery. The large pneumonic areas as well as the greatly enlarged lymph glands of the hilum were shown on subsequent examinations to become smaller and smaller and ultimately to clear up leaving nothing but a calcification to attest for past events. The work on childhood tuberculosis during the past few years has proved quite conclusively that the prognosis in first infection by the tubercle bacillus is favorable. The fact also was brought out that of the adult tuberculosis, 50 to 75 per cent had evidence of previous childhood lesions as shown by calcifications. Undoubtedly, still more had evidence that was not found. In fact, 100 per cent must have had a previous first infection, otherwise they would not have developed the adult form of tuberculosis. Now the fact that so many people have been found to have been at one time or another during their early life victims of first infection, the added fact that childhood tuberculosis was shown to be very curable and again that the most frequent cause of death was adult tuberculosis rather than first infection made some people wonder as to the accuracy of our past observations. And may it hurriedly be said that there was sufficient reason for wondering. The facts produced leave no doubt but that the body quite readily overcomes first invasion by the tubercle bacilli. The question that remains, however, is whether the body in its non-infected state is a greater barrier to the development of progressive and fatal tuberculosis than is the already infected body with its allergy. Lack of conclusive evidence in this matter is due to an absence of human experimental animals upon whom equal doses of tubercle bacilli could be given to infected and non-infected persons. This would give us definite first hand information. As it is, we are forced to resort to conclusions based on ordinary laboratory animal experimentation and assume that the same immunity phenomenon is also present in man. There

are a number of things which point to the fact that these are fundamentally the same.

1. Initial infection in both man and animal leads to an involvement of neighboring and distant lymph glands. In other words, the tubercle bacilli spread freely through the lymph channels without much apparent resistance.

2. Reinfection in both man and animal is characterized by a lack of lymph gland involvement and a tendency toward localizing the tuberculous process. In chronic pulmonary tuberculosis in the human, this is shown by the frequently observed apical process which tends both to remain localized and to heal with no appreciable enlargement of the hilum lymph nodes. In the animal, it is noted by the observation that a subcutaneous inoculation of tubercle bacilli in an infected animal results in a localized superficial ulceration within a few days time which tends to heal leaving no lymph gland involvement as seen in the first infection case.

3. In both man and animals, a positive tuberculin test is obtainable after first infection.

From what has been said, it appears quite safe to assume that infection phenomena observed in the animal also take place in man. It is most likely that fundamentally they both react the same to the invasion of tubercle bacilli.

Much work has been done since the days of Koch on the results of animal infection by the tubercle bacillus. The contributions of Krause,<sup>5</sup> Baldwin,<sup>6</sup> Gardner,<sup>6</sup> Calmette,<sup>7</sup> and many others have more than confirmed the original observation of Koch that initial infection in animals gives a relative immunity. The recent work of Soper and Dworski<sup>8</sup> in this respect is also very convincing. They studied tuberculous meningitis in the infected and non-infected rabbit. The series consisted of three groups: (1) Animals that had been infected a few weeks previous by virulent tubercle bacilli and recovered; (2) animals inoculated with heat-killed bacilli a few weeks previous; (3) non-infected animals.

After inoculating these three groups with an equal dose of virulent tubercle bacilli into the meninges, he found that the previously non-infected rabbits succumbed to extensive and massive tuberculosis; those vaccinated with heat-killed bacilli lived much longer, but finally died of progressive disease; the rabbits vaccinated with virulent bacilli mostly recovered leaving evidence of healed tuberculosis. His conclusion was

that a previous infection lent a protective influence to the organism.

The work of Rich and McCordock<sup>9</sup> on infection by the tubercle bacillus is most interesting. As opposed to the school which maintains that allergy is a manifestation of immunity, they assert that allergy is a separate and distinct entity and rather than being an aid to immunity is perhaps a detriment to it. Allergy will at times produce severe necrosis which surely is very destructive to tissue and can hardly be considered a benefit to the organism. In support of this view, they cited as examples previously infected animals that have practically lost their allergic response to tuberculin, but whose ability to localize and kill tubercle bacilli at the site of injection is very much in evidence. The immunity mechanism appears to be unimpaired even though the allergic phenomena have practically disappeared. They favor the idea of desensitizing patients with small doses of tuberculin which will lessen allergy, but retain immunity. The work of Rich and McCordock sounds very convincing and it is quite possible that tuberculin therapy may again return for more general usage particularly if this new indication means anything and also when we consider the new tuberculin perfected by Long and Seibert of Chicago.

In an attempt to obtain the latest opinions on this important subject, a personal letter was sent to a number of our outstanding tuberculosis workers asking for their present views on first infection.<sup>10</sup>

Dr. Lawrason Brown answered as follows:

"It seems to me without any question that the first infection renders one less susceptible to active and progressive tuberculosis. Of course, this susceptibility may die out. It is also possible that the first infection may help to localize succeeding infections in the lung rather than permit them to pass through into the glands.

"Have you seen the recent work of Rich in the Johns Hopkins Bulletin? It is most interesting."

Dr. Eugene Opie gave this reply:

"A healed or healing tuberculous infection, I believe, confers immunity but the first infection if sufficiently severe may be a grave danger.

"I am sending a reprint discussing this question."

Dr. Leroy Gardner replied:

"In reply to your letter of April 23rd, I may state that the opinion prevails today that a first infection with the tubercle bacillus confers a condition of hypersensitiveness and of relative immunity upon the tissues of the rest of the body, and that these states persist as long as the primary infection maintains any degree of pathological activity. Therefore, I would say with-

out hesitation that the child who has been infected with a minimal number of tubercle bacilli is in a much better position to cope with subsequent infections than if he had never come into contact with the tubercle bacillus. If you care to go further into the subject, I would suggest that you refer to Colonel Bushnell's book, *A Study on the Epidemiology of Tuberculosis*, published by William Wood and Company, 1920. Colonel Bushnell went very thoroughly into the subject of tuberculosis developing in the aboriginal races which had never had previous contacts with the tubercle bacillus. In this work you will find references to the literature which should prove helpful to you."

Dr. Edward Baldwin answered:

"I was out of town soon after your letter came so simply sent you one of our 1921 reports as the best answer I could make to your question. Possibly you had read the article of Dr. Gardner and mine before.

"Personally, I never could accept the idea that one infection if it is mild would cause an increased susceptibility to later infection or to an active disease from a later infection. The difficulty is in separating the cases who are latent and active from those that are healed. If the first infection becomes latent but never quite healed, of course we never should confuse those with the kind that leave no after effects. No doubt infections occurring in adolescent ages are more serious because they hang on and develop into progressive disease during early manhood and womanhood. Experimentally we know that mild infections do change the character of subsequent ones, even overwhelmingly bad ones. That is, a secondary infection which may be called super-infection is made a chronic progressive disease rather than acute."

Dr. H. J. Corper replied with this interesting letter:

"I am not surprised that there is considerable discussion regarding the results of first infection by the tubercle bacillus. I might say also that my opinion on this is probably worth as much as every one else's. The reason for this discrepancy of opinion is easily understood when one realizes that probably all of our tests available today are more or less tests of allergy and not of immunity. I think this was very well brought out in Drs. Rich and McCordock's recent article in the Johns Hopkins Bulletin. Of course, we have been text-book bred in the conception of allergy and we are hardly to be blamed for thinking allergy and immunity run parallel. If beliefs, however, are permissible, I should like to dissent with this opinion and point to the fact that allergy is a double-wedged weapon balanced by that unfortunate condition, anergy.

"I believe that there is still much work to be done in the study of immunity in tuberculosis and especially in a segregation of immunity from allergy and this cannot be done unless we enter fully into an understanding of whether the mere inflammatory reaction of allergy is destructive to the tubercle bacilli or merely acts as a diluent and under favorable conditions may not be a good focus for the development of the bacillus unhampered. The solution of these problems must



come eventually when we have a fuller appreciation of the tubercle bacillus as the real disease producer and strike at the problem on a quantitative basis as body cell to tubercle bacilli.

"I am frank to confess my ignorance in elucidating these studies at the present time because they resolve themselves into the use of almost inconceivable numbers of animals and a big organization. I am sure you realize what a big eye-opener Dr. Opie's studies have been concerning that so-called first infection which doesn't exist but is really repeated small infections.

"I might call your attention again to the stumbling block met by Koch in the original use of tuberculin. If this first infection and its expression in allergy were as significant as we thought, would Koch have fallen into the pitfall in his original studies when he advocated tuberculin as a therapeutic agent? Do not think me too critical of this entire consideration when I call your attention to the fact, that at the present time we are almost restricted to the use of mechanical procedures in our treatment of tuberculosis and the Calmette BCG vaccination is still hanging fire, yet what more ideal conditions could there be for demonstrating the significance of first infection than in the newborn infant?

"I am sure you could ramble on just as well as I in pointing out explanations and I can only close by saying that the future holds in store for us some striking surprises in so far as immunity in tuberculosis is concerned."

Dr. Allen K. Krause answered:

"It can easily and definitely be shown by experimentation that a first or preliminary infection of tubercle bacilli materially protects the recipient, that is, any type of animal susceptible to tuberculosis, against successive or secondary infection from without.

"There is every reason to believe that, everything else being equal (which of course it never is), a person exposed to tuberculous infection and receiving enough infection to be sensitized yet not showing active and progressive infection, is better able to cope with our present civilization, so far as tuberculous infection is concerned, than a person who has never been exposed to tuberculous infection."

Dr. Calmette of the Pasteur Institute replied as follows:

"Here is my answer to the question you have asked me. It is certain that a light primary infection not followed in a short time by a reinfection gives immunity. But if the primary infection is severe and followed by repeated reinfections, the primary infection becomes sensitive rather than protective.

"The necessity of a light infection (and moreover it must be as guarded as possible in case of the young child) is so evident in permitting the organism to resist outside infections that we definitely consider that in BCG vaccination with a living but avirulent bacillus and sufficiently attenuated to constitute an effective vaccine.

"The phenomenon of Koch concerns resistance of the organism relating to first infections and it is ob-

served only in subjects whose primary infection is recent or when the primary infection has indicated a developing tuberculosis.

"I have explained all that in my book on the preventive vaccination of tuberculosis published by the Messon Publishing House, 120 Boulevard Street, Germain, Paris, VI, in 1928."

The determining factors involved in producing progressive and fatal disease or recovery appear to be the number of tubercle bacilli to the dose and the resistance of the host. The greater the dose, the more unfavorable the outcome. The resistance desired, if we are to accept the opinion of Rich and McCordock, is to have much immunity with little allergy: in other words, we want the immune forces to destroy the bacilli or localize their activities with as little local or general disturbance as possible. From the experimental work so far done it seems that this is best accomplished by a light primary infection and allowing a number of weeks time interval before being subjected to a reinfection. We realize of course that the perfect state would be eternal freedom from the tubercle bacillus, a non-infected body with no possibility of infection, but in our present civilization when at most any time we may be precipitated into a hot-bed of tuberculosis it does seem that a body fortified by a light infection stands the best chances of survival.

This opinion is further strengthened by the work of Dr. Lurie, at the Henry Phipps Institute,<sup>11</sup> which showed the fate of the tubercle bacillus in various organs of the body in both the infected and non-infected animal. The organs considered were the spleen, liver, lung, bone marrow and kidney. Dr. Lurie demonstrated that tubercle bacilli injected intravenously into non-infected rabbits were deposited in greatest number in the spleen, then in the liver, lungs, bone marrow and kidneys in the order given. They multiplied until the second to the fourth week when destruction of the tubercle bacilli by the body manifested itself. Destruction of the bacilli occurred in the spleen, liver and bone marrow, but they multiplied in the lungs and kidney until death. If and when recovery was the result, destruction of the bacilli also then took place in the lungs and kidney as well as the other organs beginning the second to fourth week. In the previously infected animal, the bacilli inoculated began to be destroyed immediately without preliminary multiplication.

The question naturally arises whether vaccination by attenuated tubercle bacilli such as Calmette recommends is a wise procedure. It is not well to dismiss this idea without careful thought. Workers such as doctors and nurses in particular who expose themselves to the hazards of tuberculous infection at some time or other in their lives involuntarily become vaccinated by the patients they serve. The tuberculin test becomes positive. Tubercle bacilli have gained entrance to the body in what numbers they know not. It might well be discussed whether the doctor or nurse who enters into a known source of infection should be vaccinated by the Calmette method or by the patient to doctor or nurse method. Whatever method is used it seems imperative that the possibility of a reinfection for a number of weeks should be guarded against. And so the doctor or nurse who in the course of treating the tuberculous patient develops a positive tuberculin test would perhaps be best safeguarded by a change of environment for a few weeks or months with plenty of rest, proper food and stimulating air and sunshine. As a substitute for

the old adage, "Physician, know thyself," it might be well to say, "Physician, know thy vaccination."

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## ETHYLHYDROCUPREINE

Clinicians of large experience have grown skeptical about the use of ethylhydrocupreine (optochin) in the treatment of pneumonia, whereas they were once enthusiastic, and hopeful about its possibilities. In a review of this subject, Cahn-Bronner cites an extensive literature and concludes from his own experience and a review of numerous authors that ethylhydrocupreine is not superior to quinine and that neither drug is a specific in the treatment of pneumococcus pneumonia. The following with reference to ethylhydrocupreine appears in *New and Non-official Remedies*: "Clinical investigation indicates that the drug may be of value in the treatment of lobar pneumonia, if a sufficient amount can be administered sufficiently early without untoward effect. To avoid such effect it is proposed to secure low absorption through the administration of the free base by mouth. The hydrochloride may be administered intramuscularly, but is liable to be irritant. Intravenous administration seems to be contraindicated. The drug has a definite value in the treatment of pneumococcal infections of the eye (*ulcus corneal serpens*)."  
(*Jour. A. M. A.*, March 22, 1930, p. 888.)

## NO INTESTINAL ANTISEPTIC

There is really no such thing as an intestinal antiseptic, if that term is defined as equivalent to disinfectant, there being no known influence capable of killing the micro-organisms in the living intestine. If the term is defined to include inhibition of the growth and diminution in the number of intestinal microbes, then diet (milk diet in most adults) constitute perhaps the most important influence of that kind. Mild mercurous chloride might qualify as an efficient drug with a tendency in this direction. Phenolsulphonates (sulphocarbolates) are worthless. (*Jour. A. M. A.*, June 14, 1930, p. 1939.)

## POSSIBLE DEATH FROM DRINKING ETHYLENE GLYCOL ("PRESTONE")

A death is ascribed to drinking Prestone. Prestone is ethylene glycol. It is an excellent antifreeze agent for automobile radiators but a questionable beverage. Ethylene glycol has been introduced as a nontoxic substitute for benzene in lacquers and paints. There is no record of untoward effects from its proper use. Taken as a beverage, intoxication and death are reasonable expectations. (*Jour. A. M. A.*, June 14, 1930, p. 1940.)

## EVULSION OF THE PHRENIC NERVE FOR PULMONARY TUBERCULOSIS\*

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THE *sine qua non* in the treatment of pulmonary tuberculosis is, and until a specific remedy is found, will be, rest. It is so fundamental and withal so simple, so much so that not infrequently it becomes difficult to apply, that it seems pertinent from time to time to refresh our minds regarding its basic importance. And likewise it appears wise to accept and apply any measure or combination of measures which will insure more complete cessation of lung activity and to report and discuss concerning their virtues and deficiencies.

Artificial pneumothorax has found without question its rightful premier place in the accepted present day armamentarium for treating progressive unilateral tuberculosis of the lungs and in recurrent or ungovernable hemorrhage cases. Extrapleural thoracoplasty is as firmly established, particularly in handling the chronic excavated one-sided lesion, where pneumothorax has failed. These two measures have been used so universally and over such a length of time that their therapeutic value is quite fixed and at a very high level.

Interruption of the function of the phrenic nerve is the third procedure which definitely affords pulmonary relaxation and compression and therefore more complete rest.

Simple section of the phrenic nerve, so-called phrenicotomy, was first suggested and used by Stuert<sup>1</sup> in 1911. He recommended it chiefly for predominantly unilateral basal tuberculosis where pneumothorax was prevented by adhesions. Sauerbruch<sup>2</sup> in 1913 working quite independently of Stuert reported five cases where phrenicotomy had been beneficial, noting particularly that no disturbance of heart action or respiration ensued. He also felt in combination with pneumothorax that the possibility of effusion was diminished. Schepelmann<sup>3</sup> in 1913 suggested phrenicotomy for early lung tuberculosis. Some years elapsed with very little being done with phrenic nerve operations until 1921 when Goetze<sup>4</sup>

and Felix<sup>5</sup> found that about 25 per cent of diaphragms were not immobile following simple sectioning of the nerve and attributed this failure to the presence of accessory fibers entering the main trunk line below the point of section. Each of them proposed a radical phrenicotomy to insure complete and permanent diaphragmatic paresis. Felix called his operation "phrenico-exairesis" and claimed that it resulted in a "marked curtailment of the respiratory activity of hemi-thorax and a diminution of the capacity of that side of the chest, causing a relaxation of the lung." Felix's operation is the one commonly used in this country today and consists practically of a complete evulsion of the nerve.

Since 1921 a rather voluminous literature on phrenicectomy has been produced with markedly varying opinions. H. Alexander<sup>6</sup> in 1922 felt that the chief benefit from radical phrenicectomy was on basal lesions though he noted that upper lobes were benefited also; he thought that the operation was indicated before every thoracoplasty and in testing the contralateral lung. O. Goetze<sup>7</sup> in 1922 felt that "every pneumothorax except that which gives extremely satisfactory results from the very beginning should be combined with a radical phrenicotomy." Frisch<sup>8</sup> in 1922 thought that phrenicectomy was useful in pneumothorax cases with adhesions and cited instances where hemoptysis was controlled by the combination where pneumothorax alone failed. Sauerbruch<sup>9</sup> in 1923 injected a more pessimistic note and warned that the hope which many expressed for phrenicectomy for healing progressive tuberculosis had not been realized. He noted that many were improved but none healed by the procedure and felt that it was of value primarily as an adjunct. Other continental workers agreed with this view such as Rolland, Maurer and Volter<sup>10</sup> (1924), who concluded that immediate results were good but final not so good. Lehmann<sup>11</sup> in 1924 felt that the value of phrenicectomy depended on its combination with pneumothorax or thoracoplasty and held the opinion that exudative lesions do not respond well. Hauke<sup>12</sup> in 1924

\*Presented before the Minnesota Academy of Medicine, Saint Paul, October 9, 1929.

noted that the part played by the diaphragm in respiratory widening of the thorax is not significant and that artificial paralysis of the diaphragm did not cause disturbance of respiration

alone, a greater chance of early and permanent clinical cure than any other known method of treatment." As far as I can determine, this suggestion of Alexander has never had a thorough

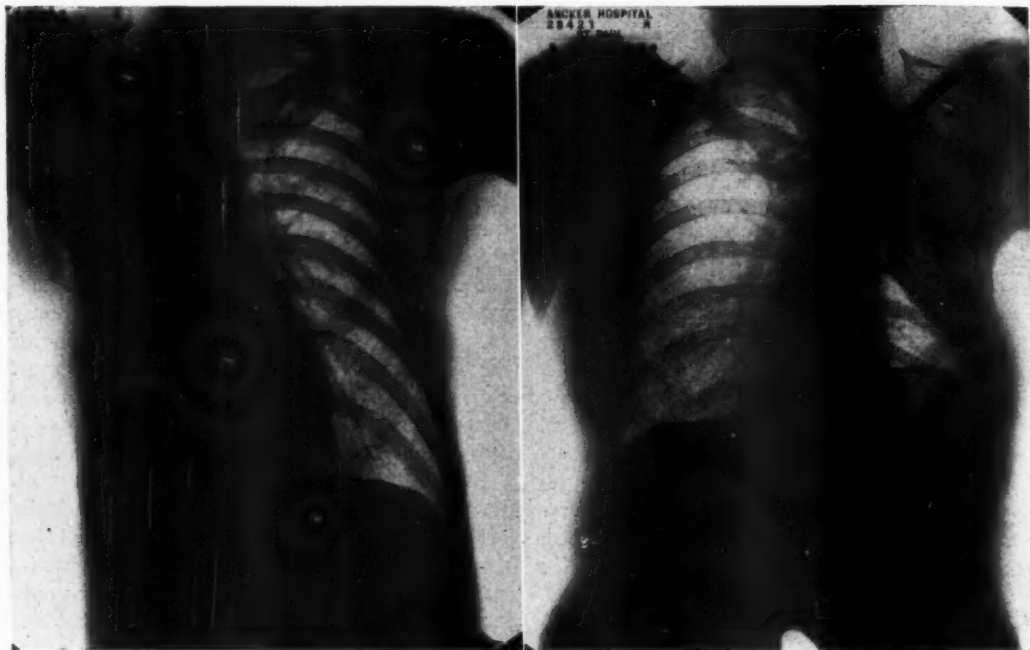


Fig. 1. Phrenic nerve evulsion with complete and upper rib thoracoplasty.

or circulation and that it did favor expectoration rather than inhibit in. He reported two failures in twenty-four cases. Laudgrof<sup>13</sup> in 1924 thought that phrenicectomy was indicated in: (1) severe pulmonary tuberculosis where one side was so advanced that pneumothorax or thoracoplasty was not permissible; (2) in bilateral disease not too extensive; and (3) in apical lesions when progressive but not pneumonic. He had had two persons with lower lobe tuberculosis who lost their sputum and bacilli following phrenicectomy. J. Alexander<sup>14</sup> in 1924 made a plea for radical phrenicotomy in the treatment of early pulmonary tuberculosis arguing that "the decidedly favorable influence of the pulmonary rest and relaxation caused by complete paralysis of a hemidiaphragm in advanced tuberculosis strongly supports the suggestion that radical phrenicotomy in conjunction with the usual careful hygienic regime, would offer patients with predominantly unilateral early tuberculosis, who are not making satisfactory progress under the hygienic regime

trial though it has distinct merit. Gravesen<sup>15</sup> in 1925 in his monograph on the surgical treatment of pulmonary tuberculosis devoted but little space to phrenicectomy and said it should as a rule be used in conjunction with pneumothorax and thoracoplasty; that more rarely it alone may be of benefit. Lilienthal<sup>16</sup> in 1925 stated that phrenicectomy is often of great therapeutic value in pulmonary tuberculosis and other disorders. At that time he apparently had had a very small experience with the procedure. He mentioned its use for diaphragmatic pleuritic pain. Alexander<sup>17</sup> in his "Surgery of Pulmonary Tuberculosis" (1925) devoted a very satisfactory chapter to phrenicectomy. His indications for its use were when used independently: (1) In acute tuberculosis where the pleura is adherent and thoracoplasty contraindicated; (2) in chronic disease with adherent pleura and with poor general condition and other lung not good; (3) in moderately or far advanced cases where pneumothorax or thoracoplasty are not contraindicated



and where it might get away from pneumothorax refills or the hazards of thoracoplasty; (4) for early cases which do not show sufficient improvement with the usual sanatorium regime. As an

and thoracoplasty remain the great means of pulmonary collapse and that phrenicectomy is a supplementary resource not to be underestimated or neglected. Wolf and Lossen<sup>21</sup> in 1927 noted ob-

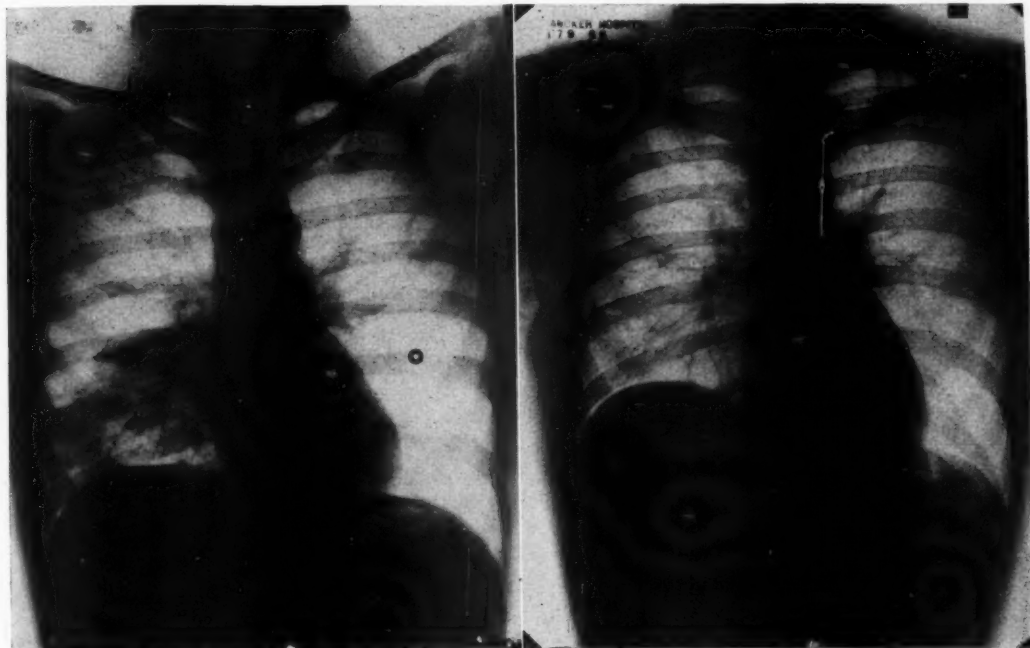


Fig. 2. Phrenic nerve evulsion for lower lobe tuberculosis. Note resolution of right lower lobe lesion after phrenicectomy.

adjunct to pneumothorax he recommended its use: (1) when partial or total pneumothorax was not producing satisfactory results; (2) supplementary to satisfactory pneumothorax in order to cut down the frequency of refills, to help reduce the incidence of effusions and to reduce the degree of expansion. He further stated that it is rapidly gaining favor as an operation to be performed before every thoracoplasty. Alexander did not mention its use for unilateral basal lesions and stressed the virtue of phrenicectomy as an adjunct remedy rather than use alone and urged no waiting period after but more surgery such as thoracoplasty at once. Bacmeister<sup>18</sup> in 1926 reported eighty cases in which phrenicectomy was used and concluded it was suitable and valuable as an adjunct. Moreau and Olbrecht<sup>19</sup> in 1926 held the opinion that the ideal theoretical indication was in a lesion limited to one base and thought in this instance phrenicectomy was preferable to pneumothorax. Berard, Guilleminet and Desjacques<sup>20</sup> in 1927, after reviewing results in fifty-one cases, concluded that pneumothorax

literation of a cavity after phrenicectomy. Geer<sup>22</sup> in 1927 advocated its use preliminary to thoracoplasty and cited four cases of basal lesions which had been improved markedly following phrenicectomy. Matson<sup>23</sup> in 1927 noted improvement in upper lobe cavities following phrenicectomy and urged its routine use preliminary to every thoracoplasty. He also felt it was of value in conjunction with partial pneumothoraces, and because of its simplicity and great value thought that phrenicectomy must be considered next after pneumothorax and before other radical procedures. He stated "as a simple procedure in selected cases and as a supporting operation we are convinced of the value of phrenicectomy." Davies<sup>24</sup> in 1928 said that phrenicectomy was a great help in handling basal lesions and that it always should be done in long standing pneumothorax cases before expansion. Lord<sup>25</sup> in 1928 stated that phrenicectomy "still holds a place among measures designed to assist in putting a tuberculous lung at rest, but that it is of relatively little value as an independent procedure but

it may serve to estimate the capacity of the opposite lung when that is uncertain or as a preliminary to a more radical operation and that it is to be regarded as of limited therapeutic and

fect upon upper as upon lower lobe lesions and that it was of no help as an adjunct to pneumothorax.

The anatomy of the phrenic nerve is worthy of

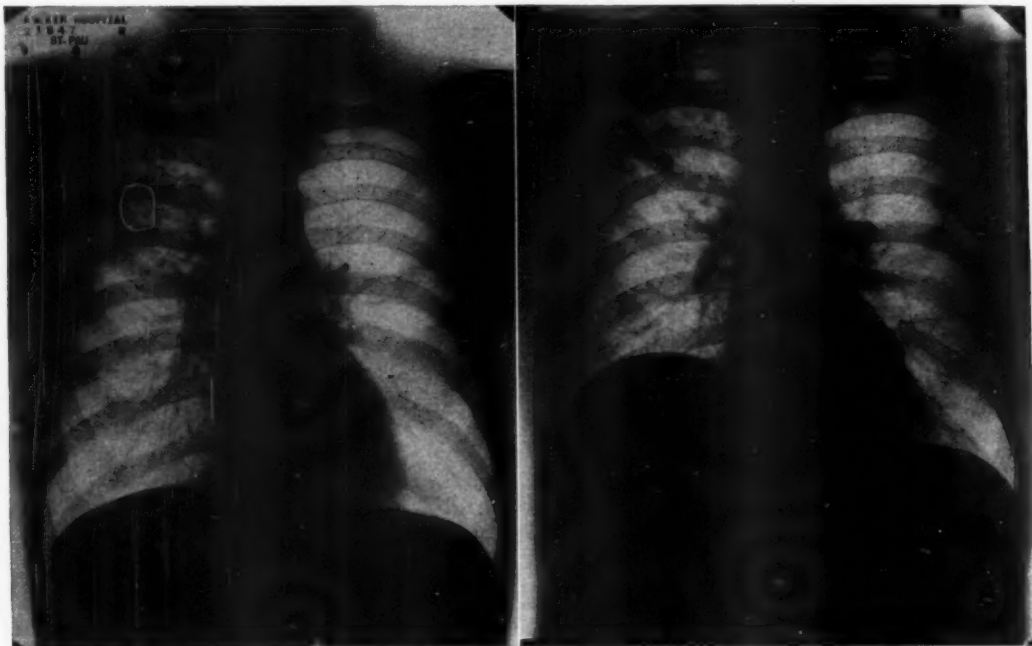


Fig. 3. Phrenic nerve evulsion for upper lobe cavity. Note obliteration of right upper lobe cavity after phrenicectomy.

diagnostic value when used alone." Mayer and Leitch<sup>26</sup> in 1929 report cases in which upper lobe cavities of over three centimeters in diameter closed following phrenicectomy. They noted that at times a diaphragm apparently adherent fluoroscopically will rise after phrenicectomy. Loewenthal<sup>27</sup> in 1929 reported five cases in which pneumonia developed after phrenicectomy and thought this was due to lack of proper aeration due to immobility of the lung. Holmboe<sup>28</sup> in 1929 on the other hand thought phrenicectomy should be given a trial because it is free from danger and in many cases undoubtedly gives good results. Matson<sup>29</sup> contended in 1929 that evulsion of the phrenic nerve was indicated as an independent procedure in those cases wherein a thoracoplasty is impossible and as a preliminary to every thoracoplasty. Wells<sup>34</sup> in discussing the results of three hundred phrenicectomies in 1929 felt that it is valuable in a wide variety of pulmonary tuberculosis cases. He found it had as much ef-

fect upon upper as upon lower lobe lesions and that it was of no help as an adjunct to pneumothorax. The anatomy of the phrenic nerve is worthy of brief review. It takes origin from the third, fourth and fifth cervical roots, with occasional fibers from the seventh and eighth cervical and first thoracic. Its main trunk is in association with a small ascending cervical artery for a short distance and runs beneath the sternocleidomastoid muscle downward and inward across the anterior surface of the scalenus anticus muscle, thence beneath the subclavian vein into the thorax along the external surface of the pericardium to the diaphragm. Goetze could demonstrate no anastomosis between the right and left phrenic nerves. Felix could not show any connection between the vagus and phrenic nerves. In about 25 per cent of people there is an accessory phrenic nerve arising from the fifth cervical, sometimes according to Felix from the third, fourth or sixth. The phrenic nerve according to Felix supplies the entire motor innervation of the diaphragm except for a few fibers that arise from the twelfth intercostal nerves. Lemon<sup>30</sup> concluded that if the dia-

phragm receives any innervation from the intercostal nerves their usefulness is so small that it is inadequate to prevent atrophy or to permit of contraction when the nerve is stimulated. Mat-

son then looped around behind the internal mammary artery. In one instance he found the associate phrenic passing through the wall of the subclavian vein. Because of these anatomical varia-

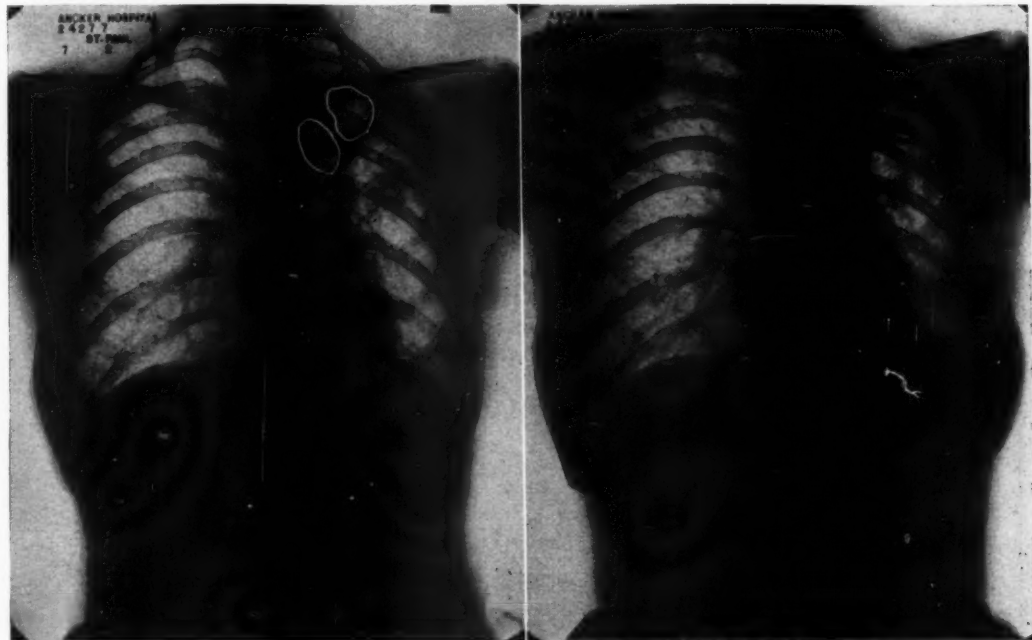


Fig. 4. Phrenic nerve evulsion for upper lobe cavitation. Note closure of two cavities in left upper lobe after phrenicectomy.

son<sup>30</sup> in dissecting out one hundred and twelve phrenic nerves on cadavers found only 72 per cent typically situated. He found double phrenics with associated fibers on the face of the scalenus anticus eight times. In four instances associate phrenics came from the subclavian nerve. Once he found a bilateral and once a unilateral absence of the typical phrenic nerve, there being no main trunk on the anterior surface of the scalenus anticus, but two large trunks coming mostly from the fifth cervical close to the point of origin of the subclavian nerve. All three of these passed down in front of the subclavian vein and came off so far lateralwards that they could not be located by the customary incision. In twenty-three instances the accessory phrenic fibers came in common with the subclavian nerve from the fifth cervical root. Six times the accessory nerve was apart from the subclavian nerve as a separate branch. In five other instances it formed a loop around the vein. Once two associate phrenic trunks passed in front of the subclavian vein,

tions, Matson felt that the Felix type of radical phrenicotomy is not without danger.

The effect of a unilateral phrenicectomy in a person with a non-adherent diaphragm is a complete paralysis and a passive rise of the hemidiaphragm into the chest to a full expiratory position. Several months may elapse before it attains its ultimate position. It may not be completely immobile due to tugging of the central tendon by the normally active side or to the so-called paradoxical movement effected by intra-abdominal pressure. The reduction of lung volume by phrenicectomy varies between 25 and 35 per cent. The pulmonary relaxation subsequent to phrenicectomy and the reduction in lung volume affords a certain amount of rest though the elimination of the pumping or piston-like action of the diaphragm is the most important single factor resulting from the operation. This affects chiefly the lower but also the upper lobes. Brunner<sup>31</sup> found a right lung of 2400 c.c. volume reduced 600 to 900 c.c. by thoracoplasty and that it was

reduced 400 to 800 c.c. by phrenicectomy. He further noted that cough and expectoration were easier after phrenicectomy. In other words, the anatomical and physiological effects of phrenic

right diaphragm rises higher than the left but my experience has been the reverse.

I know of no case where bilateral phrenic nerve evulsion has been done for pulmonary tubercu-

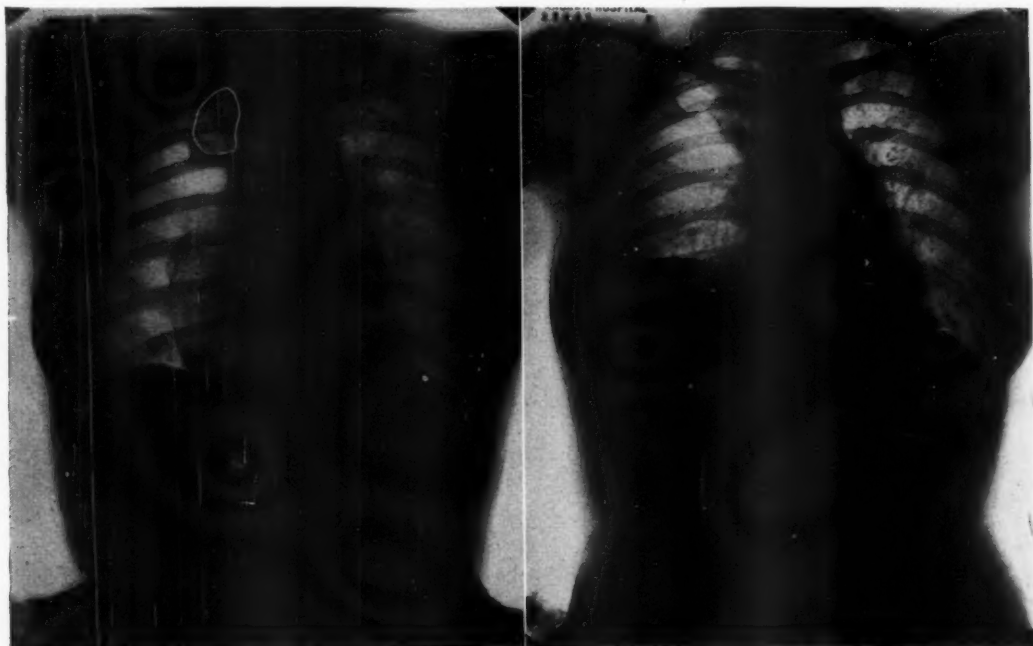


Fig. 5. Phrenic nerve evulsion adjunct to pneumothorax. Cavity held open by adhesions which closed after phrenicectomy.

nerve interruption are similar to thoracoplasty though less marked.

Lemon<sup>29</sup> observed experimentally that section of one phrenic nerve caused paralysis and atrophy of the entire hemi-diaphragm on the same side and that after five months there was no evidence of cross innervation or regeneration. He further felt after observing the effects of both unilateral and bilateral phrenic neurectomy in dogs that perhaps the functional importance of the diaphragm had been overestimated.

It is obvious that the height to which the diaphragm rises after phrenicectomy and the beneficial results obtained are closely related. This factor is one which cannot be foretold and one which will be fully known only after several months have elapsed. Alexander found the average elevation of the paralyzed diaphragm in twenty cases, including right and left, to be 7 cm. at the end of inspiration and 3 cm. at the end of expiration. Most authors have found that the

losis. Sauerbruch has performed the operation for persistent singultus on both sides with only temporary dyspnea; Wells has done the same thing. Lemon has done it experimentally on dogs with no apparent ill effect. In one of my cases, that of a woman with a basal lesion, the diaphragm on the opposite side was completely immobile because of adhesions. Following phrenicectomy she was quite comfortable with two fixed diaphragms and now, three years after, is alive and well.

My experience in using phrenic nerve evulsion in the treatment of pulmonary tuberculosis is limited to ninety-three cases from the Pokegama Sanatorium and the Ancker Hospital Tuberculosis Pavilion. Twenty-eight were in combination with extrapleural thoracoplasty, fifteen of these with the complete thoracoplasty operation, and thirteen in combination with resection of the upper five to eight ribs. It is difficult to correctly evaluate the value of phrenicectomy



used in this manner. To me it seems the logical procedure and I unhesitatingly urge the operation preliminary to every thoracoplasty for the reason that the capacity of the lung to be oper-

an unusually large cavity was allowed to go eight months because of the extraordinary reduction in the size of the cavity but finally was submitted to an upper lobe thoracoplasty with success.

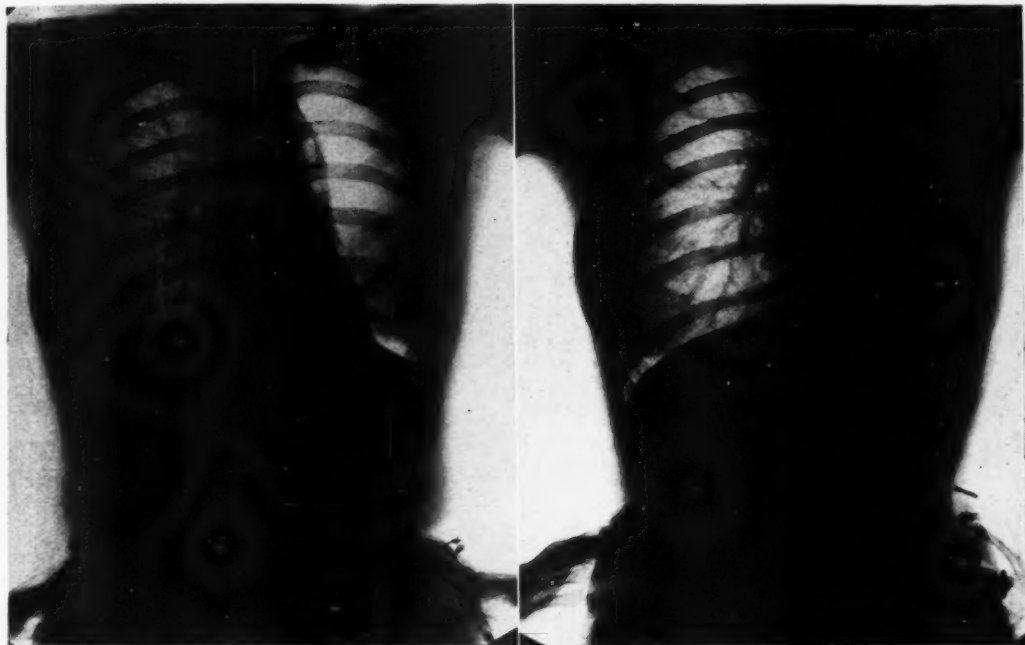


Fig. 6. Phrenic nerve evulsion with expansion after pneumothorax for five years. Note reduction capacity of left hemithorax rendering complete expansion impossible.

ated upon is reduced thereby from 400 to 800 c.c. This, of course, gives more lung relaxation and therefore more effective compression and more rest. Furthermore our experience<sup>32</sup> in studying unsuccessful thoracoplasty cases with the aid of iodized oil has shown that a certain percentage of chronic fibroid lungs have varying degrees of bronchiectasis which calls for the most complete collapse possible in order to check cough and sputum.

Forty-five of my series were done on persons with upper lobe cavities in whom there was such a definite tendency for the cavities to close after phrenic neurectomy that thoracoplasty was withheld to see what would happen eventually. Twelve of these achieved complete obliteration of their cavities with resultant loss of bacillary sputum. Two others apparently did the same thing within two months, only to have symptoms later with reopening of the cavities. Fifteen have been done too recently to judge results but at this time do not look encouraging. One with

Ten patients with unilateral basal lesions have submitted to phrenic nerve evulsion. Five are clinically well. One died of generalized tuberculosis. Another has been done so recently as to be uncertain as to its outcome. One other had a normally moving diaphragm following the operation but did well with eighteen months' bed rest. Thoracoplasty and pneumothorax were necessary in the other two cases.

Thirteen phrenicectomies have been done in conjunction with pneumothorax. One of these had an upper lobe cavity held open by adhesions; with phrenicectomy sufficient additional relaxation was afforded so as to obliterate the cavity. Three have been done preparatory to permitting the lung to expand. One of these was an original upper lobe lesion with a bronchogenic spread into the lower lobe on the same side. A perfect result was obtained with pneumothorax and on allowing the lung to partially expand it was noted that the upper lobe was quite clear and expansile, but that the lower lobe was ap-

parently non-expansile. After phrenicectomy the upper lobe expanded completely, filling the thoracic space but leaving the lower lobe collapsed. The fifth pneumothorax case was one of lower lobe cavitation incompletely closed by air and which did close following phrenicectomy. The sixth was done because of premature expansion caused by an obliterating pleuritis subsequent to an effusion. In this case phrenicectomy was not successful in preventing reopening of upper lobe cavities and the patient has undergone an extrapleural thoracoplasty. Seven others had upper lobe cavities held open by adhesions and were uninfluenced by phrenicectomy.

One case was that done in a patient with a five centimeter cavity close to the left root and in whom a dense shadow behind the heart suggested bronchiectasis. An intratracheal iodized oil injection proved a lower lobe bronchiectasis and phrenicectomy was done hoping the bronchiectasis would be benefited. Her cavity and bronchiectasis continued on their way unaffected. In one instance phrenic nerve evulsion was done for a fulminating lesion where pneumothorax could not be induced because of adhesions and thoracoplasty was contraindicated; death ensued despite the phrenicectomy.

Six patients in this series of ninety-three continued to have normal diaphragmatic movement following the operation. In two of these no nerve could be found which, when stimulated, caused diaphragmatic contraction. Two probably had deep accessory fibers. Second operations in the other two were successful in finding and evulsing the nerve.

To summarize: I feel that phrenic nerve evulsion should precede every thoracoplasty operation for pulmonary tuberculosis, as it does afford increased pulmonary relaxation. Some workers feel that aspiration episodes are more likely to follow if phrenicectomy is done first but I have yet to see it happen. And, furthermore, it certainly is true that the nerve can be found more readily before thoracoplasty than after because apparently the dropping of the first rib alters the cervical anatomy. I am convinced that phrenicectomy alone in a high percentage of one-sided basal lesions holds out opportunity for an excellent clinical result and believe that it warrants primary trial here unless the lesion is a fulminating one, in which case pneumothorax is the treatment of choice. It is also quite apparent that a

certain number of upper lobe cavities will close with phrenicectomy and I, therefore, disagree with Alexander, Sauerbruch, and others who feel that all phrenicectomies should be immediately followed by thoracoplasty. A few months' waiting period unquestionably will save from 20 to 30 per cent of these people further operative interference. Its use in conjunction with pneumothorax is rational, especially when used preliminary to re-expansion. Furthermore, it seems wise to employ it in those pneumothorax cases where adhesions are preventing a satisfactory collapse before resorting to more radical measures such as pneumolysis, opened or closed, or thoracoplasty, although in this field it apparently is the least helpful.

In conclusion I would state that:

1. Phrenic nerve evulsion is the third most valuable means we have for effecting more complete lung rest than bed rest alone affords.
2. It should be employed preliminary to every extrapleural thoracoplasty done for pulmonary tuberculosis irrespective of diaphragmatic adhesions.
3. It is particularly efficacious alone when used for unilateral lower lobe tuberculosis.
4. It will succeed in obliterating a certain number of upper lobe cavities.
5. It can be used to advantage in combination with pneumothorax especially in cases with adhesions and prior to re-expansion.
6. It is well to emphasize that phrenic nerve evulsion is no overnight cure for pulmonary tuberculosis, nor anything remotely approaching it. A carefully supervised sanatorium regimen is just as important with as without the operation and this point cannot be overstressed.

NOTE: My grateful appreciation is due Drs. A. R. Colvin, L. E. Daugherty, D. G. Gardiner and E. M. Jones, who have done the operating on the above cited cases and who at all times exhibited an indispensable spirit of coöperation.

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#### THE CUTANEOUS ABSORPTION OF MERCURY

It requires little imagination to appreciate the uncertainties that must attend the problem of dosage when such a relatively insoluble substance as mercury is applied to the skin. The size of the particles, the nature of the adjuvant, the place of application and its conditions, and the vigor with which inunction is practiced are some of the complicating features. The assumption that only the mercury globules rubbed into the follicles are gradually absorbed had led to the clean inunction method proposed by Cole and his collaborators. Some indication of the efficacy of inunction procedures can be secured by estimation of the substance that is eliminated. This has been done and it was found that the amount of mercury which is absorbed and excreted after inunction is dependent directly on the concentration of the metal in the base—that is, 5, 25 and 50 per cent preparations show that the excretion is about in proportion to the concentration in the ointment used. Again, contrary to what many have assumed, colloidal mercury ointments showed no greater excretion of mercury than official old fashioned mercury ointments of equal concentration in benzoinated lard. Furthermore, massive or intensive weekly inunctions of a 30 per cent mercurial ointment may lead to an equal or higher mercury excretion than the simple daily use of 50 per cent ointment or even certain types of intramuscular injection. (*Jour. A. M. A.*, April 26, 1930, p. 1322.)

#### PRESIDENT HOOVER SIGNS BILL CREATING NATIONAL INSTITUTE OF HEALTH

Recently President Hoover signed a bill sponsored by Senator Ransdell of Louisiana, which provides that the Hygienic Laboratory of the United States Public Health Service shall become the national institute of health.

In a recent radio broadcast, an authorized summary of which was published in the *United States Daily*, Senator Ransdell stated:

"The most important feature of the bill is the provision for fellowships, which would be in the nature of chairs, as those chairs are founded in institutions. The most valuable asset of the people of the country is brains. There are young men who, by reason of lack of finances and lack of encouragement, and the inaccessibility of a scientific environment in which to develop, have fallen by the wayside.

"The purpose of a measure of this kind is to have potentially available a provision whereby a young man could be aided, not for a few days or a few weeks to finish his education, but to aid him after he has graduated, providing he is an extraordinary student. I contemplate that nobody but outstanding students will receive consideration under this act, and their first duties would be to come to the national institute of health and receive their training and stimulus, and then be subject to detail wherever health problems might be desired to be taken up."

—*Health News*, June 30, 1930.

## THE TREATMENT OF BOILS AND CARBUNCLES BY ROENTGEN RAYS\*

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A CARBUNCLE may be regarded as an aggregation of boils and may be a much more serious condition than a boil. The same methods of treatment are used for both.

The usual methods of treatment are hot poultices, incision, local application of ointments and lotions, administration of drugs internally, and vaccines. Those methods of which the purpose is abortion of the process are often not effective; the abscess continues to form, and later breaks down or is incised, leaving a discharging wound that takes a varying length of time to heal. The infective discharges are likely to cause similar lesions nearby.

Hot poultices are to be condemned because of their aptitude for spreading the infection to adjacent hair follicles. Although they frequently relieve the pain, the patient must curtail his activities more or less while they are being used. Incision is often necessary, but it is to be avoided whenever possible as it makes a discharging sore which may heal slowly, leaving an ugly scar. Ointments and lotions are messy and seldom of much value in aborting the disease. Drugs given by mouth, particularly the preparations of sulphur and tin, are recommended by some, but opinions as to their value vary. The vaccines used are either of the stock or autogenous variety. They are useful only in cases of recurring boils, and the autogenous variety has the further disadvantage that it takes some days to prepare it. The vaccine treatment, to be of value, must be given over a period of several weeks or months and, in addition, is expensive.

In spite of the fact that roentgen rays have been used successfully in the treatment of boils and carbuncles for more than twenty years, the value of the method apparently is not appreciated by most physicians. We believe that the treatment of these lesions by roentgen rays, although not always efficacious, is superior to the methods generally used.

When the process is in the indurated state, before it has "come to a head" and before it is discharging, treatment by roentgen rays causes rapid regression in about half of the cases and considerable relief in the remainder. When a core has formed, or when the sore is discharging, not as much can be expected from treatment. However, in most cases, besides shortening of the duration of the disease, definite analgesia is brought about, which is much appreciated by the patient. If the patient is having successive boils in a given region, roentgen rays will prevent infection of other follicles. We have never seen a new boil develop inside the field irradiated.

TABLE 1

COMPARISON OF RESULTS IN EARLY AND LATE TREATMENT  
OF BOILS AND CARBUNCLES BY ROENTGEN RAYS

Result	Treated in less than three days from onset, 44 cases	Treated in more than three days from onset, 56 cases
Analgesia	43	50
Abortion	28	—
Prompt improvement	10	8
Slow improvement	2	42
Failure	4	6

In order to evaluate the treatment, we reviewed the histories of 100 cases in which we knew the outcome of the disease. These comprised seventy-four cases of boils and twenty-six cases of carbuncles. For the roentgenologic treatment to be of maximal value, it should be given early in the course of the disease (Table 1). We considered that we had aborted the lesion when it disappeared in two days or less, and that the treatment was a failure if the extent and duration of the process were not appreciably shortened, even though considerable analgesia might have been obtained.

When the lesions were treated early, they were in the stage of induration. Comparison of the results on the basis of whether induration or

\*From the Section on Therapeutic Radiology, The Mayo Clinic, Rochester, Minnesota. Submitted for publication June 3, 1930.



actual suppuration was present is shown in Table 2.

As would be expected, boils respond more favorably to treatment than carbuncles (Table 3).

TABLE 2

RESULTS OF TREATMENT OF BOILS AND CARBUNCLES BY ROENTGEN RAYS WHEN INDURATION WAS PRESENT COMPARED WITH RESULTS WHEN SUPPURATION WAS PRESENT

Result	Induration present, 58 cases	Suppuration present, 42 cases
Analgesia	54	39
Abortion	28	—
Prompt improvement	15	3
Slow improvement	11	33
Failure	4	6

The technic used in these cases varied according to the stage and extent of the disease. Specifications of dosage for a typical boil were as follows: 135 kilovolts; 4 mm. aluminum filter; 16-inch distance; 5 milliamperes; ten minutes. Carbuncles were given a higher dose (same factors for fifteen to eighteen minutes). Care was taken that the field was wide enough to include all of the diseased tissue. If the removal of the surrounding hair was necessary to prevent infection of the other follicles, an epilatory dose was used. Specifications for this dose were as follows: 80 kilovolts; no filter; 16-inch distance; 6 milliamperes; five minutes. This was used also in the treatment of folliculitis. We have not found it necessary to repeat irradiation of a boil.

## COMMENT

It is well known that the lymphocytes are the most radiosensitive cells in the body, and that destruction of lymphocytes is one of the first effects noted following exposure to moderate doses of radiation. It is important, in this connection, to emphasize that in treating inflammatory lesions, large doses of roentgen rays are neither necessary nor advisable because of the great sensitivity of these inflammatory cells.

The mechanism of the effect is not perfectly understood. A plausible explanation is this: Since it is known that small round cells act as a defense against pyogenic infection, and that lymphocytes

are extremely sensitive to radiation, it is fair to assume that when these cells in an inflammatory lesion are destroyed, the protective substances in them are liberated in larger amounts for im-

TABLE 3

RESULTS OF TREATMENT OF BOILS BY ROENTGEN RAYS, COMPARED WITH RESULTS OF TREATMENT OF CARBUNCLES

Result	Boils, 74 cases	Carbuncles, 26 cases
Analgesia	58	25
Abortion	26	2
Prompt improvement	14	4
Slow improvement	30	14
Failure	4	6

mediate defense than is the case when they remain intact. This theory at least is in accord with known clinical facts.

There are several advantages in the use of roentgen rays in these conditions. The treatment can do no harm. It is painless and inexpensive, does not consume much time of either the patient or the physician, and is almost always effective. Another advantage is that in the early stages in which other methods offer least, roentgen rays are of most value. If a patient comes with an indurated swelling, suggesting an early boil, the physician has nothing that he can use that will abort the disease. If the indurated type of lesion is treated with roentgen rays, not only are all dressings and infected discharges obviated, but rapid, marked benefit should ensue in more than 80 per cent of the cases, and the lesions should heal without scars.

The disadvantage of this form of treatment is that the facilities for giving it are available only in the larger centers. However, a boil, and particularly a carbuncle, is a debilitating enough condition to warrant the sending of the patient to a place where he can be adequately treated by a method that gives him the best chance for prompt relief.

## CONCLUSION

We believe that the treatment of boils and carbuncles in the early stage by roentgen rays is the best at the present time and that it should be utilized more frequently.

## SOME OBSERVATIONS ON THE ETIOLOGY OF TIC DOULOUREUX WITH THE CLINICAL REPORTS OF A NEW METHOD OF TREATMENT\*

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AT the time of our first presentation of the treatment of tic douloureux by the method of alcohol injection, some one objected to this plan of treatment on the ground that it was unscientific, for it only stopped the pain but it did not cure the disease.

At the time, this objection seemed rather trivial to us, because with the majority of the patients, when their pain was relieved they instantly declared themselves to feel perfectly well, and proved their assertion by returning at once to their customary activities.

As our experience increased with this form of treatment this objection, which seemed unimportant at the time, began to interest us more and more. One could, of course, make the same objection with reference to any other nervous condition, such as epilepsy, migraine, asthma, hives, etc. As soon as their attacks stop, the patients are to all visible appearances entirely well.

There were, however, always a few, indeed a very few—to use a political expression—who made up a troublesome minority. This minority after an apparently successful injection, and by successful we mean an injection which produced anesthesia in the entire area of the distribution of the branch of the nerve injected, while their severe pain was relieved, still complained of various annoying sensations in this area of anesthesia. These sensations differed greatly in description if not essentially in character, because they could all be classified under the title of paresthesias. In some the complaint was simply of the numbness which the injection had caused. In others the sensations were described as of a burning, creeping, crawling, pulling, drawing, pressing nature. They also varied in intensity of complaint as much as they did in the variety of their description. In some they were merely casually mentioned when the patients were asked about their faces. In others they seemed so distressing that the patients made al-

most constant complaint of them, and occasionally a patient would say these sensations had caused him even more suffering than his neuralgic pain had done.

All of us know very well the tendency of a patient, no matter what symptoms they have had before taking, so to speak, to date everything after taking, not to some change in the character of their symptoms or any constitutional weakness in themselves, but to the method of therapy, whether of a medicative or surgical nature. And so these patients were only following the general rule of human nature when they attributed as the cause of their subsequent discomfort the effects of the alcohol on the nerve injected, whether rightly or wrongly, since the paresthesias occurred usually in the nerve injected.

Looking at the matter from the patient's angle it was easy to see the justification for their way of thinking. These paresthesias occurred mostly in the area of distribution of the nerve injected.

The area supplied by other branches remained comparatively free. Our first thought was also to accept the patients' reason and consider a perverse or insufficient reaction of the nerve to the alcohol as the most likely cause. But with further consideration and experience with these paresthesias it was quite evident that other probable sources should not be ignored.

We know quite well that oftentimes, especially in a fundamentally functional nervous patient, one clinical syndrome as the result of treatment is transformed into what seems to the patient something else entirely different.

As an illustration, we have frequently observed a quite definite transformation in epileptics as the result of treatment, the epileptic attack either being greatly modified in character, or even taking on a migrainous character. Then the patients, ignoring the fact that their epilepsy had disappeared, would return complaining that our medication had given them headaches which they did not have before. Only the other day we had a patient with narcolepsy in whom the first

\*Presented at a meeting of the Ramsey County Medical Society, at St. Paul, Minnesota, April 28, 1930.

reaction to the treatment was a change in the clinical picture from that of the sleeping attack to one of a quite severe nausea. Naturally, this patient as well as his family placed the blame for the nausea on the medication.

If these paresthesias had only occurred in patients who had received injections of alcohol we might still be attributing the cause to alcohol.

It was soon brought to our observation that patients who were surgically treated and never had received an alcoholic injection also were subject to the same distressing paresthesias.

Frazier reported in 1925 ten surgical patients who suffered severely after their operation from similar symptoms. Of this series he at that time says the sensory root operation in five instances had been performed and in all but one of these no doubt there had been an error in diagnosis. The patients did not have trigeminal neuralgia.

Because we feel that such patients aid very materially in broadening our conception of the etiology of this type of neuralgia we will cite his report on one of them. This case was operated on March 23, 1916 (section of the sensory root). Some features of the neuralgia were atypical but others seemed sufficiently characteristic to justify the major operation. Course, March 7, 1917 (almost a year later): Following operation the patient complained bitterly of a burning, throbbing sensation in the upper and lower alveolar processes and in the molar region. These disturbing sensations continued day and night without intervals of relief, and on one occasion it was noted that there was a vasomotor flush on the affected side when the pain was severe. The patient was seen a number of times in the course of the intervening seven years until May 2, 1923, when she was readmitted to the University Hospital. On May 6 the superior sympathetic ganglion was excised and the perisymphatic plexus stripped from the common carotid artery from a point 2.5 cm. below the bifurcation to 2 cm. above the external carotid artery. Result—April 11, 1927, the patient wrote that she was feeling worse rather than better and that she was never without a pulling, burning, throbbing sensation in the cheek.

In commenting on these ten cases Frazier says the records speak for themselves. In only one case did the patient obtain any relief, and in this case there still remains the doubt as to whether

the relief was permanent, as the patient cannot be traced.

In conclusion, the author says, "This problem is of some importance because the number of patients afflicted with conditions that have these irregular form pictures is not small and the patients themselves lead a wretched existence. That one of the patients was entirely relieved by Christian Science suggests a functional rather than an organic basis for her pain, and one may have to be content to view the condition as of psychogenic origin and discontinue any effort to modify or relieve it by physical measures."

In a later article under the title "Fourteen Years Experience With Fractional Section of the Sensory Root as the Major Operation," Dr. Frazier has again discussed this subject. This article presents, as its title would indicate, a technique for the partial section of the sensory root in order to preserve intact the normal sensation in as large a part of the face as possible and still successfully relieve the pain. As to the reason for this modified operation the author says, "One may well inquire why so much concern about conserving as much of the root as possible. To appreciate the significance of this discussion it must be understood what the patient's reaction is to the total loss of sensation in the affected region. So agonizing is the pain that the patient before operation welcomes any measure that guarantees relief. After the operation he notices not only that there is no sensation but also that the face and tongue seem swollen. Many patients accept these and other sensory defects, and continue content so long as they can live in the happy assurance that they will never have another paroxysm. To some of the others these wide-spread sensory disturbances continue to be a source of more or less annoyance. There is a smaller group who develop paresthesias after the operation. In a few instances these paresthesias are a source of great annoyance."

We have not infrequently seen this type of case, of which the following is an excellent example.

On January 16, 1925, Mr. H. was referred to us by Dr. Alfred Hoff for the treatment of tic douloureux by alcoholic injection. Patient was 60 years old, occupation railway mail clerk, married, wife living and well, three children living and well, no history of serious illness. Has had pain of a spasmodic nature in the right side of the face for nearly a year, starting ap-

parently with a bad tooth. This was extracted. Then the pain moved to the tooth in front of this, which was likewise extracted. The pain kept moving forward until four teeth in a row in the right lower jaw had been removed. The pain still continued. Touching the right lower lip, the second right lower incisor, eating, spitting, talking, etc., brought on the pain. Pain has been so severe the past week that the patient was scarcely able to eat or talk. The response of this patient to the injection of both the second and third branches, which were successfully injected, was chiefly a change in the nature of symptoms. The severe shooting pain was stopped but in its place the patient complained of a burning, crawling feeling, especially in the right eye, which made him very uncomfortable, but he had no tic pains. You will note the burning, crawling sensations in this instance were located in the right eye, the area of the first branch and entirely outside of the distribution of the two branches which were injected. Further injections made over a period of several months did not seem to lessen the patient's discomfort. Because of this he was advised to go to the Mayo Clinic in Rochester for the radical operation, which he did. The operation seemed to increase rather than diminish the distressing paresthesias. The patient was in the habit of visiting us in the office and calling us on the phone to curse the unlucky day on which he submitted himself to the surgical procedure. The way he expressed it was, "The sensations were bad enough after the alcohol injections but many times aggravated after his operation."

We have devoted so much space to the description of such patients because in our opinion they do not indicate so much a mistaken diagnosis as they do the degree of the constitutional nervous predisposition and its sensitiveness to central reactions in such patients. We have in music Yankee Doodle with variations, and sometimes it is difficult to recognize the well known air because of the variations. So also we have migraine with variations, and likewise tic douloureux with variations, the variations depending upon the degree of burdening of both the vegetative and the cerebro-spinal nervous systems of the patients.

We have a letter from this type of patient, whom we unsuccessfully injected without relieving his severe spasmodic pain, and then afterwards gave him the treatment which we are going to describe later on. We want to read this letter. The date of this letter is March 3, and it is in answer to an inquiry of ours as to the patient's condition.

"It is now six months since you operated in my face, and it is still stiff. There is yet spots that I don't feel a pin point. I can't open more than three-fourths of an inch. That side have been ever since I was with

you. It bothers my hearing and the ear and I have sting in that eye now and then, specially when I read. My mouth feels inside as if it was scalded after the pain is over. I never feel anything hot there inside. When I drink hot coffee it feels like a cold piece of rubber inside, but when I stick my finger in to feel if it is cold I find it just as warm as the other side, but when I drink cold water or milk it feels just like it run a cold stream of water outside. I hundred of times try to wipe it up and was nothing, just dry. I cannot go any place. I am afraid I get cold in my chin. I was out once this winter and got cold in it. I was just to the mail box and got so stiff in my jaw so I could not open it in three days. I had to suck milk for food. Yes, there is lots of more things I could tell you. Now, Dr., I am not kidding about anything. I just will tell you how it is working on me. I must say I have had a good winter's sleep every night without that killing like pain. but Dr. you never told me how it was going to feel in any way or action. I was afraid ones to get lockjaw or be periled in my face. it would not have been more than right to post me a little about what was to be. I soaked bread in coffee and ate in the hospital for two days. I could only drink my coffee but still pay for meals. Well Dr. I will hope for the best. Must stop, etc."

This letter has all the characteristics of the fundamentally functional nervous patient. It shows plainly that the patient is of a marked introvert type. Every sensation, and especially those affecting his face, he describes in analytic detail. Fear and worry fill his mind constantly, fear of lockjaw, paralysis, cold, apprehension of what the various sensations indicate, just like any neurasthenic. Then there is a touch of the paranoid taint shown in his reproach, "But Doctor, you never told me how it was going to feel in any way or action." Also in his expression relating to his stay in the hospital, "I could only drink my coffee but still pay for my meals."

It does not seem to us in the consideration of the etiology of the so-called trigger zone, which is so constant and so important in these cases since it is the spot of spots from which the pain is released, has been given sufficient importance. This trigger zone is the only place in the whole sensory area of the fifth nerve which shows any objective symptoms. Outside of this zone sensory symptoms to objective methods of examination seem perfectly normal. In this zone sensation to touch and pin prick is intensely hyperesthetic. The slightest touch or movement here, even in some cases the threat to touch, releases the spasm of severe pain. One of the peculiar characteristics of this trigger zone is that it may lie in the area which is supplied by the third



branch, as in the tongue or lower lip, while all the pain occurs in the first and second branches around the nose, upper cheek, eye, and forehead.

The successful injection of the two branches where all the pain is experienced does not relieve the pain in the slightest. In order to stop the neuralgia, the trigger zone and the branch supplying this area must be sought out and this branch injected. Another thing worth noting is that the location of the trigger zone may change quite suddenly. Whereas it may have been located the day or the week before, or in the previous attack, in the lower lip supplied by the third branch, it may leave this area and take up its abode somewhere on the side of the tongue; or even abandon the area of the third branch entirely and manifest itself in some spot in the distribution of the first or second branches.

Then again these hypersensitive spots or trigger zones may likewise disappear completely as suddenly as they came, and with their disappearance, presto, like magic the spasmodic pain stops. It is quite plain according to this that it is not the blocking of the nerve with alcohol which is the essential objective in the injection, but the rendering anesthetic the trigger zone or zones which seem to be the sine qua non in the production of the pain. The curious behavior of these trigger zones would of itself suggest the functional nature of the condition and indicate its systemic or central character.

Genuine tic douloureux may not only change its location on the same side of the face but in one attack may present itself on the right side of the face and then later on transfer its field of action completely to the left side of the face, or vice versa, the right side remaining perfectly free from either pain or any disturbance of sensation. We have also seen this phenomenon occur not infrequently in cases of migraine. The pain here may appear for years in the migrainous attack above, say, the right eye, and then without rhyme or reason leave and appear in a similar location above the left eye.

The following case of "tic" is an example of this.

Mrs. C., aged 56, occupation housewife, was referred to us by Dr. George Sherwood, January 7, 1912. At that time the patient complained of pain in the left side of her face in the distribution of the second branch in the region of the upper lip and nose. Successful injection of this branch did not relieve the

pain. With the injection of the third branch, the patient obtained complete relief. A year later this patient returned with the tic on the opposite side of her face, the left side having given her no further trouble. An injection of the right third branch gave the patient complete relief. This patient has returned at intervals of a year or two for relief of her tic pain, which has sometimes returned on both sides of her face but for the most part the return has occurred on the left side. The last time we injected her was in June, 1927. Then, both the second and third branches on the left were injected, the right being entirely pain-free.

Our experience with tic douloureux has been largely coincident with what may be called the focal infection period and its importance in disease. We, in keeping with medical thought in general, have naturally been greatly instructed and influenced by it, especially since we were confronted with a condition which was situated so close as the face to the great centers of focal infection. The profession, particularly those surgically inclined, in times past have seemed determined to find the etiology of tic in some source of focal infection. We are of the opinion that the number of good teeth alone which have been extracted with the thought in mind that they were the chief etiological factor would run into the millions.

But some one may say that he knows of a case which was completely relieved of his pain after the removal of a bad tooth. Granted this to be true, this does not prove that the tooth was the factor. For every tooth which has been pulled with subsequent relief of pain, ten thousand have been extracted with no benefit whatever.

We have often heard of cases of epilepsy in which the epileptic attack has remained away for months after a circumcision. We would suggest another explanation for this, which is that in both instances a hyperesthetic or trigger zone somewhere has been temporarily dulled by the effect of the local or general anesthetic.

It is interesting to note what the neurological opinion on this subject was just preceding the focal infection era. Space will only permit us to quote one authority. We have selected the one who was considered the most preëminent in our language during our medical school days. This was the great English neurologist, Gowers. We will quote from Gowers' textbook on "Diseases of the Nervous System" published in 1893. Gowers says, "Neuralgia of the fifth is probably more frequent than all the other varieties to-

gether, and it presents in most typical form the characteristic symptoms of the disease. Nor is this surprising when we consider that the fifth is incomparably the most important nerve of common sensibility in the body." Of tic douloureux he says, "The pain is invariably in the region of the fifth nerve, sometimes in the whole nerve, sometimes in a part only, but rarely confined to a single branch. Convulsive spasm in the face may accompany the pain (convulsive epileptiform neuralgia)." We have quoted this last sentence especially for the name which he applies to it, "convulsive epileptiform neuralgia." Gowers also state, "Neuralgic pains are common in hysteria. Every variety of true neuralgia may be met with due to the neuropathic disposition, and they present the characteristic distribution, tender points, etc., of the ordinary forms." He speaks of hysterical neuralgia due to the neurasthenic disposition and then sharply distinguishes other forms with a different etiology as gouty, diabetic, herpetic, malarial, syphilitic, degenerative, etc. About the only difference between Gowers' article on neuralgia and more recent articles is that he makes the neuropathic type of a central and endogenous origin with the fundamental cause as the neuropathic disposition a very important etiological factor while more recent articles, influenced no doubt by the brilliant results in many diseased conditions by the removal of focal infections, tend to minimize the endogenous factor and to place more stress on some exogenous cause. In the light of our experience we would regard Gowers' article in 1893 as the more comprehensive.

We have long felt from an intimate experience with these patients in the course of twenty years of injection treatment that tic douloureux was not only, as Patrick has said, a disease "*sui generis*," "*etwas für sich*," but that the most important and essential nature of it was in the neuropathic predisposition of the patient. This conception answers another question which came up in the discussion at the time we read a paper on this subject before the State Society at St. Cloud in October, 1924. Dr. Michaels, we believe it was, asked why, if trigeminal neuralgia was essentially of a functional character, it makes its first appearance in the majority of cases in the later decades of life, while our experience with functional conditions would indicate that they

appear during the early decades. The answer to this is that functional nervous conditions have appeared in these patients many years before their tic douloureux, only they presented such an entirely different clinical syndrome with varying localizations that they were never really associated either in the minds of the patients or the physicians whom they consulted as in any way having a relationship with their tic pain. We have observed many patients who substantiate in their histories this statement.

We have much evidence in our own experience as well as excellent medical corroboration to cause us to believe that a true tic douloureux presupposes the neuropathic disposition and is therefore anaphylactic, or, perhaps better, allergic in nature. By the term allergic we mean that some localization in the body is especially conditioned or sensitized because of the neuropathic predisposition through a dysfunction of the vegetative nervous system. This conditioned, sensitized localization does not necessarily need to be in the area of the fifth nerve causing tic douloureux. It may lie in the cervix uteri producing severe menstrual pain, or in a thalamic or subophthalmic area of the brain upon whose function our emotional control depends and thus produce a mania or a melancholia, or in some cortical brain area causing idiopathic epilepsy. In the case of tic douloureux the area of the fifth nerve happens to be the conditioned place.

The following case is a good illustration of what we have just been saying.

Mr. M., aged 45, a farmer, was referred to us on April 14, 1930, by Dr. Max Kern of St. Cloud, Minnesota. His chief complaint was that of a facial spasm on the left side which began four years previous and had persisted intermittently ever since. There was nothing significant in his physical or neurological examination. The significant facts were discovered in his family history. His father was an asthmatic. His mother and one brother had severe sick headaches and another brother was subject to hay fever. Here was undoubtedly a family with a marked allergic tendency in which three members at least manifested their allergic hypersensitivity by exhibiting three different clinical pictures occurring in different localizations. It must be quite evident that local irritations and focal infections in such cases could only be of minor importance. This family history should convince us of the constitutional and inherited nature of the different clinical syndromes in functional nervous conditions.

Believing firmly in this conception of all so-called functional nervous conditions and also

having the feeling that genuine tic douloureux belongs in this category, we selected a form of therapy which has in recent years, according to numerous favorable clinical reports, attained some signal successes in many functional nervous cases. This is the so-called fever therapy. This is not the place here to enter into any general discussion of the fever therapy.

Grete Drecker in an article on Fever Therapy in Schizophrenia says, "It produces an effect on the morbid process itself." Speaking especially with reference to the malaria treatment in general paralysis he says, "Through the infection the circulatory conditions in the entire body are changed and the circulation itself quickened. As a result there takes place a stimulative and tonic influence on all the vital systemic processes. In this way the defense mechanisms of the body are called forth as they are in the natural infections."

There has been much debate as to the rôle which the fever plays in the beneficial effect. What particular part the fever itself plays we do not know. We do know this, however: without a somewhat severe reaction with chill followed by a fever of at least 102° F., better 103, 104, or 105, the therapeutic effect is not so favorable.

We selected in this series of cases milk as the fever producing agent. The milk was boiled and allowed to cool and then injected intramuscularly into the buttocks four days in succession, beginning with 5 c.c. the first day and increasing the dosage on the succeeding days by 5 c.c. or a lesser amount according to the degree of reaction obtained in those cases where milk failed to react vigorously enough we used triple typhoid as the foreign protein.

We gave the milk four days in succession in order to secure a series of quick reactions. The first injection almost invariably increased the pain. Even during the height of the reaction in the fourth injection, rather severe tic pain was present in some of the cases.

In no case was the fever reaction less than 102, and in some cases it reached a height of 104 and even 105. These reactions lasted only a few hours and then quickly subsided. During the treatment and continuing for some time afterwards, we gave a capsule containing from one-half to two-thirds of a grain of phenobarbital with 10 grains of calcium lactate after each meal. In some of the cases during the reaction

morphine or some derivative of it was administered either hypodermically or by the mouth, as needed to make the patients comfortable.

We have treated ten cases thus far according to this method. In all of these patients the tic was of long standing. One case was first injected with alcohol by us in 1908. During all this time this patient, whenever her pain came back, which it did at intervals varying from one to several years, returned for another injection. So it may be said of these patients that they knew their tic. They also had very little faith in any other form of therapy other than the alcohol injection. It was not easy to persuade them to accept any other plan of treatment.

The first patient was Mr. S., 80 years of age, salesman, referred to us in 1927 by Dr. T. J. Moynihan of this city. His first alcohol injection was May 19, 1927. His last was two years later on May 25, 1929. On August 16, 1929, this patient came to the office complaining of severe tic which kept him awake during the night and made it very difficult for him to eat or talk. He was given 5 c.c. of milk intramuscularly; also the capsule mentioned before. The patient was directed to return to his home in Minneapolis and go to bed at once. In our experience it is usually an hour or longer after the injection before the reaction occurs. The next day he was unable to come to the office but reported having had a severe chill after going to bed, followed by fever, increased tic pain in his face and a general malaise. When we saw him several days later he had not entirely recovered his strength. As he was free from pain we did not repeat the milk injection but continued his capsules. Since this time we have had two reports from this patient. On November 15, 1929, he wrote us that for two weeks after his operation he was entirely free from pain. After that he was for several nights awakened by severe pain once each night, and during the daytime said that touching either the left side of his nose or the upper lip caused flashes of pain in the face, not of a severe nature. "These little pains," quoting from patient's letter, "kept up right along until three weeks ago when they suddenly ceased troubling me and I have been entirely free from pains of any sort in the nerve ever since." On March 21, 1930, the patient came to office to report on his condition. He said he had had only two attacks of real sharp pain since his report to us in November. These were about two weeks apart, and the last one was three weeks previous. They lasted only a few seconds. There is hardly a day, however, when pressure on his lip will not give him a little sharp twinge, and sometimes he notices it in eating. He still takes his capsule regularly.

The result in this patient cannot be said to have been entirely satisfactory, but he has been much more comfortable than he was before. We

must also remember that he only had one milk injection. His pain has never been troublesome enough since to cause him to feel the need of another injection.

Space will not permit us to report all of these cases. We will report only the ones which were especially difficult, where the trigger zones were not only numerous but also hard to penetrate with alcohol.

The first case of this character was Mr. E., aged 46, referred to us by Dr. Carl Larsen on September 28, 1926. This patient had very severe attacks of tic pain in the second and third branches of the fifth nerve on the left side of the face. His chief trigger zone seemed to be located around the base of the tongue and the pillars of the fauces on the same side, a hard place to reach with the alcohol. He was injected by us successfully at that time and once afterwards in November of the same year. He then remained free from pain until September, 1929. At this time his pain returned in the same locality and to the same agonizing degree. This patient was also a bleeder, which made the alcohol injection still more difficult. We injected the third branch first, successfully, but without relief of pain. In attempting to inject the second branch a severe hemorrhage occurred which caused such a swelling of the entire face that a repetition of the injection before the subsidence of some of the swelling was impossible. Here a difficult situation presented itself. The alcohol injection together with the swelling, only seemed to aggravate the patient's painful attacks. In order to relieve the patient in this dilemma we suggested the milk injection to him. We gave him the first injection and a prescription for the capsules as in the first case and permitted him to return home. Although the patient was a very robust individual all of his reactions were exceedingly severe. The patient's wife telephoned me the morning after the third injection saying that her husband had been restless, feverish, and a times delirious, during the night, and wished us to come and visit him. We found him with a temperature of 103, pulse 100, in a somewhat drowsy and stupid condition. After a good saline catharsis, by the evening of the same day all of these symptoms had disappeared. After the second injection of milk the patient never had another tic pain. A letter from him on the 14th of last month says, "In answer to your letter in regard to the trifacial neuralgia treatments you gave me six months ago, they sure helped me as I have had no pain at all since. Feel fine. Thanking you kindly, etc."

The next patient was Mrs. J., aged 66, referred by Dr. Victor Thompson of Marine, Minn. She was a housewife, lived in Stillwater, Minn., and the working diagnosis was tic douloureux of the right side. The patient had had pain in the right side of the face since November, 1925. The patient consulted us the first time April 5, 1926, because her pain had become unbearable. At this time both the second and third branches of the right fifth nerve were injected. These injections gave

her complete relief from pain until in August, 1928, a period of over two years. On August 27, 1928, the right third branch was injected because her pain had returned. The patient was again relieved of the pain until in October, 1929. On October 26, 1929, we again injected the right third branch, securing anesthesia in its whole area except for a small spot on the right side of the tongue at its very tip. This region still remained sensitive to pin prick and the patient's pain continued the same as before the injection. Having in mind our success with the patient just reported we changed our treatment from the alcohol injection to the milk. On October 26, 1929, the patient was given 8 c.c. of milk intramuscularly and on the three following days 10 c.c. The reaction after each injection was quite marked, accompanied by chill and fever. After the second milk injection the pain disappeared completely. A letter dated March 5, 1930, from the patient says she had not had any pain since the last treatment.

The next patient, Mrs. R., was 42 years of age in 1908 when we first injected her. She has been successfully injected at different periods since then, the last time on February 4, 1929. On November 9, 1929, this patient returned for another alcohol injection. Instead of the alcohol injection she was given the four milk injections with fair reactions. Some pain, however, still continued after the fourth milk injection, so my associate, Dr. Engberg, after an unsuccessful alcohol injection repeated the four milk injections on November 19, 1929, just seven days after the first series. During the last injection the patient had a moderately severe anaphylactic reaction which was promptly relieved by a hypodermic of adrenalin. The patient after this series was relieved of her pain. A letter received from this patient dated March 4 said she had some "jumps" from jaw to tongue but no pain. By "jumps," from our previous experience with this patient, she means some muscular twitching in this locality.

The last patient which we will report at this time is Mrs. K., aged 54, referred to us September 16, 1925, by Dr. James Blake of Hopkins, Minn. In the history at that time, the patient stated that she had always been well except for severe migraine in her earlier years, especially at her menstrual time and when she became excited. This patient had trigger zones in all three branches of the right fifth nerve, so all three branches were injected. It was somewhat difficult to stop her pain but this was finally accomplished.

She remained pain-free until last summer, when the pain gradually returned and in September became quite severe. On October 2, the patient came to the hospital and all three branches of the right fifth were reinjected in the course of four or five days. Although the anesthesia produced by the injections seemed good, especially in the second and third branches, the pain still continued, apparently starting from various places in the distribution of the first branch. On October 17, 18, 19, and 20 the patient was given injections of milk: 5 c.c. the first day, 10 c.c., 12 c.c., and 15 c.c. on the succeeding days, reacting well to each injection. The pain stopped in this patient between the second and third injections. In a telephone conversation last



week with her physician, Dr. Blake, in regard to her present condition, Dr. Blake said the patient was in good health and pain-free.

We have either letters or reports in person from all of the ten patients who have received the milk treatment, and thus far they have all remained pain-free except the first patient reported, who received only one milk injection. Before discharging these patients, we subjected them to all the irritations which had formerly started their pain, asking them to try in every way to bring on their pain by eating, drinking, talking, etc., and then, when they were unable to do so, by rubbing both lightly and vigorously the places where the trigger zones had previously existed.

Whether this method of treatment is going to be an addition to our therapy of tic douloureux, neither the number of cases nor the length of time which has elapsed since they have been treated will of course permit us to say. We do

not in our fondest imagination expect it to supplant either the need for the injection of alcohol or the radical operation, as time and voluminous clinical experience from many sources have established the undoubted value of both these procedures. We simply report this treatment as our experience in ten cases. We know in these cases it has helped us greatly to deal successfully with some very difficult situations.

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## RULES OF THE COMMITTEE ON FOODS

The Committee on Foods of the Council on Pharmacy and Chemistry publishes a revised statement of the information which should be submitted to the Committee by manufacturers who wish their food products included in the book "Accepted Foods." The Committee will consider all food products for which health claims are made as coming within its purview. If the health claims made are satisfactory to the Committee, in view of the composition and process of manufacture, the Committee will accept the product for its book "Accepted Foods," and will grant to the product the use of the seal of the Committee. If the product is found to be outside the scope of the Committee in that no health claims are made for it, and if the product and the advertising are otherwise satisfactory, the product will be exempted. A list of exempted products will be published in the book "Accepted Foods," and such products will be permitted to be advertised in the publications of the American Medical Association. A list of rejected foods will be published in the book "Accepted Foods" together with the reasons for such rejections. Rejected products will not be permitted to advertise in any publication of the American Medical Association. Infant foods, whether health claims are made for them or not, are considered to be within the scope of the Committee's consideration. (*Jour. A. M. A.*, May 3, 1930, p. 1407.)

## COLLOSOL KAOLIN NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that Collosol Kaolin is the name given by the Crookes Laboratories, Inc., to a product stated to be "a prepared clay, giving a comminuted chemically inert material of high absorptive capacity." The use of the product is recommended in various conditions, including rheumatism, neuritis and asthma. The Council points out that the Germans, who had employed it against dysentery during the war, abandoned its use and substituted charcoal. The Council declared Collosol Kaolin unacceptable for New and Non-official Remedies because of the unwarranted therapeutic claims and because of possible dangers from the therapeutic use of the product. (*Jour. A. M. A.*, May 3, 1930, p. 1406.)

## RECRESAL NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that Recresal is the product of Chemische Werke vorm. H. & E. Albert, Wiesbaden-Biebrich, Germany, and that, according to the information received from this firm, the product is sodium phosphate monobasic and is therefore nothing more than the well known acid sodium phosphate, which is official in the U. S. Pharmacopeia as sodium biphosphate. (*Jour. A. M. A.*, May 3, 1930, p. 1406.)

## MODERN TREATMENT OF VARICOSE VEINS\*

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MUCH has been written recently concerning the modern treatment of varicose veins—sufficient, perhaps, to convince the medical profession that surgical removal of varicose veins is almost a procedure of the past. Having made over 10,000 injections on over 1,000 patients during the past eight and one-half years, we are convinced of the efficacy of this treatment.

### HISTORY

Since the invention of the hypodermic syringe, attempts have been made to obliterate these veins by the injection of various solutions, but not until 1911 did this become an approved and practical method.

Linser observed that in postoperative and postpartum phlebitis, the thrombosed vein usually became fibrosed and gradually disappeared by absorption. He also observed that in the treatment of syphilis with bichloride of mercury the injected vein frequently became thrombosed, fibrosed, and gradually absorbed. These two observations led him to attempt the obliteration of varicose veins by means of bichloride of mercury injections. From 1911 until 1916 he used this exclusively as a sclerosing solution. He and his followers made many thousands of injections with practically no serious results. His end-results far surpassed any method which had been employed for the treatment of varicose veins up to that time.

In 1917 he substituted a strong sodium chloride solution for the bichloride of mercury solution. He believed this was an advanced step for two reasons: (1) because of the more rapid results obtained, and (2) because of the "entirely unfounded aversion" of many medical men to intravenous injection of bichloride of mercury. The latter prevented the widespread use of this method. Many of our most ardent advocates of this method in this country have acquired this "entirely unfounded aversion" to the injection of bichloride of mercury.

In 1925 Linser first published his results with

sodium chloride as a sclerosing solution. About 1916 Sicard of Paris began the same work, using sodium bicarbonate; later he substituted sodium salicylate, which is still used widely for this purpose in France. In 1923 Genevrier published his results using quinine hydrochloride and urethane. This solution still holds an important place among sclerosing solutions. In 1926 Nobl of Vienna published his results with calerose, an invert sugar, as a sclerosing solution.

This work was first introduced into this country by Kretchmeier, who came to this country from Germany about 1920. He did his first work at the clinic at Red Wing, Minnesota. He left no written record of his work but some of his patients presented themselves at the Out-patient Department of the University of Minnesota for a continuation of this treatment. His results convinced us that the work was far in advance of anything we had been doing for these unfortunate patients and deserved investigation.

After reviewing the German and French literature we began this work in December 1922. The two solutions widely used at that time, according to the records in the literature, were bichloride of mercury in Germany and sodium salicylate in France. The medical profession of this country were naturally very skeptical then and almost universally advised the patients against it. We, therefore, selected only the most refractory cases. During the first year we selected only those patients with badly ulcerated conditions (Figs. 1 and 2). Those ordinarily considered surgical were refused treatment.

We tried the two solutions about which we had authentic reports of good results—sodium salicylate and bichloride of mercury. Sodium salicylate when injected into the vein caused a severe cramp. Already advised against this method of treatment by physicians, this cramp was frequently sufficient to frighten the patient away and the treatment was at an end. Bichloride of mercury when injected into the vein usually gave no unpleasant sensation at the time of injection. The patient submitted to this more readily and returned for repeated injections. This led us to

\*Read before the meeting of the American College of Physicians, Minneapolis, Feb. 12, 1930.

the almost exclusive use of this solution until 1925, when Linser published his results with sodium chloride solution.

#### SCLEROSING SOLUTIONS NOW IN USE

*Bichloride of Mercury (1 per cent solution).* This solution is placed first not because it is the solution of choice for this work but because it was the first solution to fulfil effectively the requirements of a sclerosing solution. We used it almost exclusively from 1922 to 1925. Until Linser published his results with sodium chloride solution, we found no solution more desirable.

We have made in all over 5,000 intravenous injections of bichloride of mercury, and in no case in which we limited the amount to 1 c.c. of a 1 per cent solution at one session did we get any untoward results except an occasional slough.

We have had, in all, four cases of enteritis. In two cases we injected more than 2 c.c. at one session. In one case we injected sodium chloride in one leg and bichloride of mercury in the other leg. This patient had an enteritis for nearly two days, but then cleared up promptly. In one case we injected invertose in one leg and bichloride of mercury in the other leg. In this case we produced vomiting and a bloody diarrhea which lasted for nearly two days. The patient went to work on the third day.

We still use this solution in selected cases. In very sensitive patients we frequently start the patient with this solution. When it is necessary to inject hard, fibrotic, or infected areas, this solution is often the solution of choice. Occasionally we find a case in which we are unable to obtain obliteration with other solutions and do get results with this solution. We rarely inject this solution more often than every second day, although it has been shown that practically all bichloride is eliminated in twenty-four hours. The results with this solution are necessarily slow and we usually use salt or sugar solution for large or extensive varicosities.

*Sodium Chloride (20 per cent solution).* Sodium chloride solution gives excellent and rapid results; perhaps more rapid than any other solution now in use for this purpose. The two important objections to this solution are, first, the disagreeable cramp accompanying the injection and, second, the extensive slough produced by a perivenous injection or even by a slight seepage of the solution into the perivenous tissue.

*Sodium Salicylate (20 per cent solution).* This solution gives a fairly consistent thrombosis. The cramp accompanying the injection and the slough caused by escape into perivenous tissue are much

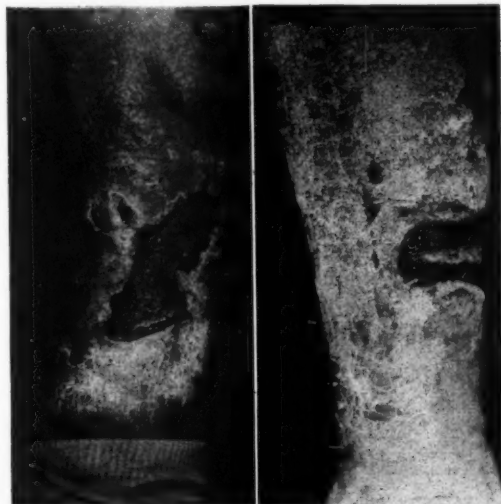


Fig. 1. (Left) Type of cases treated during our first year in this work.

Fig. 2. (Right) Ulcer open for nine years, now closed for eight years. Operated three times previously.

the same as those produced with sodium chloride solution. It cannot be used in large doses. Occasionally it may produce a thrombosis when other solutions fail.

*Quinine Hydrochloride and Urethane (10 per cent solution).* This solution produces less slough than the above mentioned solutions if it escapes into the perivenous tissue but cannot be used in large doses without producing unfavorable symptoms. It should not be used in pregnant women.

*Invert Sugar (50 to 75 per cent solution).* Invert sugar, perhaps, more nearly than any solution so far reported, fulfils the role of a sclerosing solution. It seldom produces cramp. It very rarely causes a slough in the perivenous tissues. However, it does not give as consistent results as any of the afore-mentioned solutions. The density of the solution necessitates a larger needle. This increases the discomfort to the patient and makes entrance to the vein more difficult.

The almost entire absence of slough and cramp makes this the solution of choice in the great majority of cases. We much prefer the stronger solution. The weaker fails to thrombose in many cases. If we do not get results with this solu-

tion we then try others. Nobl says he does not expect greater than 90 per cent of results with invert sugar.

*Mixture of Dextrose (50 per cent solution) and Sodium Chloride (30 per cent solution).* Recently this mixture has been put on the market.



Fig. 3. Shows destruction of intima at site of beginning thrombus.

The results are excellent so long as none escapes into the perivenous tissue, but otherwise a troublesome slough results. Dextrose (50 per cent solution) gives very good results but not so consistent as when mixed with salt.

As we travel from clinic to clinic in this country as well as in Europe it is interesting to observe the enthusiasm of various men over some favorite solution or particular method of treatment. No doubt one does become more proficient with any particular solution or method he has employed for a long period of time, but any of the above mentioned solutions will give excellent results with faultless technic. Merely getting the solution into the vein and keeping it there will give a high percentage of thromboses, but a more refined technic will give a more consistent thrombosis.

#### APPARATUS AND AMOUNT OF INJECTION

We use a 2 c.c. Luer syringe for bichloride of mercury, quinine hydrochloride and urethane,

and sodium salicylate solutions with a gauge No. 26 needle. We never use more than 1 c.c. of a 1 per cent bichloride of mercury, 2 c.c. of quinine hydrochloride and urethane, or 5 c.c. of sodium salicylate solution, at one session. With sugar and salt solution we use a 5 c.c. or 10 c.c. syringe, making two or three injections of 5 c.c. or 10 c.c. at one session. For invert sugar we use a gauge No. 21 needle.

#### CONTRAINDICATIONS

The more we have observed the results of this work the more we feel that the contraindications are very limited. Practically every patient who is not disabled by some other pathological condition may have his varicose veins treated by this method if cautiously done. Diabetics are treated if they are sugar free at the time of treatment. Nephritics are treated if their symptoms are not marked. These patients must be treated cautiously.

We have recently treated over forty cases of old thrombo-phlebitis with good results. We usually do not accept them for treatment if they have had an acute thrombophlebitis within a period of six months or unless we are certain of the lack of function of the involved vein. In these cases we always go slowly and cautiously. If the thrombosis is not extensive it is not likely to cause trouble in any of these conditions.

Pregnant women are treated to relieve distressing symptoms. If it is the first pregnancy and the patient is experiencing no marked distress, we usually advise her to wait until after childbirth. The varicose veins will frequently then disappear. If they persist between pregnancies we do not hesitate to produce a rather extensive thrombosis, if necessary, during pregnancy.

#### EMBOLI

During the first years of this work we were continually asked if we were fearful of emboli with this treatment. The records of the German and French work had convinced us that it was not so important a factor as one might suppose.

The thromboses we had been accustomed to observe had been, perhaps, in most instances, infectious in origin. These are produced by a chemical irritation of the intima causing a necrosis of the intima (as shown in Fig. 3) with a deposit of fibrin from the blood at this point and a consequent interweaving of the clot with the wall of the vessel. This made the breaking



off of emboli less likely than in the ordinary thromboses which usually lie loosely in the lumen of the vessel.

A study of the varicose veins has indicated the absence of circulation in these vessels. The valves become incompetent and the blood stands in them much the same as water in a stagnant pool and merely seeps through the communicating veins into the deep veins where it is carried back into the main circulation. Jentzer, with radiograms after the injection of strontium bromide into the veins, first demonstrated that the varicose vein really filled from above and emptied into the deep veins below (Fig. 4). Sicard later confirmed his work with radiograms after the injection of lipiodol. This would indicate that emboli, if they should break off, would be more likely to pass distally than in the normal direction.

However, the fact that pulmonary emboli have been demonstrated following these thromboses indicates that the above is only partially true and that under certain conditions the blood may pass in the normal direction and carry emboli to the pulmonary artery.

McPheeters and Rice, in reviewing the literature, collected 53,000 cases injected for treatment of varicose veins, with only seven fatal pulmonary emboli. This is a small percentage of mortality, yet high enough to warn us against any procedure which might increase the possibility of this unpleasant complication. In over 10,000 injections we have observed no case in which anything of this nature has occurred. Kilbourne calls attention to the fact that fatalities from pulmonary emboli have occurred for the most part in cases that have received a large number of injections at one session, or in those with a recent thrombophlebitis.

#### NUMBER OF INJECTIONS AT ONE SESSION

Some of the advocates of a large number of injections at one session argue that we never thrombose more than the varicose vein. This is not entirely true. The discovery of this method of thrombosing veins resulted from thrombosis of the normal or apparently normal veins of the arm following the injections of bichloride of mercury for the treatment of syphilis. Perhaps thrombosis does not extend widely into normal veins. With a small number of injections this may be negligible, but with a large number of injections it may become quite extensive. This

would necessarily increase the back pressure in the veins and consequently make pulmonary emboli more likely. We do not believe it advisable to unnecessarily increase the probability of pulmonary emboli.

Sugar solutions, which are now becoming the

#### Scheme of filling of varicose vein

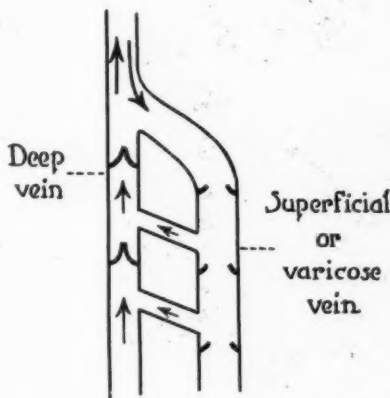


Fig. 4. Shows incompetent valves in varicose vein. Vein fills from above and blood seeps through to deep veins.

most popular for this purpose, must necessarily be used in the form of a rather dense liquid. This requires a comparatively large needle. We have found that the vast majority of patients much prefer to have not more than two or three injections at one time, and to return as often as required. The ultimate results are the same. Also a very extensive thrombosis may be accomplished by two or three injections (Fig. 5). Ten or twelve injections, as advocated and practiced by some men, not only would have been superfluous here but would have been an injustice to the patient.

The great majority of men throughout the world who are doing this work undoubtedly agree that too many injections should not be given at one session.

#### TECHNIC

When we began this work in 1922 we were not satisfied with either the technic practiced in Germany or that in France. With the former, the work was difficult to carry out and apparently much time wasted. With the latter, our percentage of thromboses was not as high as we desired

it to be. According to the former, the patient was put in the prone position with the leg raised, the vein emptied by force of gravity, constrictors put on above and below the point of injection,



Fig. 5. This entire vein on right from malleolus to groin was thrombosed by two injections.

and, presumably, the empty vein entered with the hypodermic needle. In our experience, one can be sure he is in the vein only by the aspiration of blood. If the vein is collapsed or the blood all forced out of it previously, how can you aspirate blood? Practically we have found that considerable blood enters this portion of the vein through communicating branches from the deep veins, and we are not getting a collapsed or empty vein, but only increasing the difficulty of entering it.

In injecting the full vein with the patient in the erect position, as practiced in France, our solution is diluted to a degree that it does not give the desired result in a large percentage of cases unless we inject a large amount of solution, thus displacing the blood.

The object here sought is to have the injected solution come in contact with the intima of the vessel in an undiluted form, thus giving the maximum of chemical irritation at this point. The chemical irritation causes necrosis of the intima, as shown in Fig. 3, thus bringing about the desired thrombosis.

The method we have used mostly for several years, we first mentioned in 1924. We have tried every other method that we have observed or have seen described in literature, but have found none so simple or more effective.

We have the patient sit up or stand on the table, usually in the position in which the most marked distention of the vein occurs. We insert the needle into the distended vein, then with the palm of the left hand gently compress the vein over the site of the injection (Fig. 6). Here we are careful to have the pressure extend back of the entering point of the needle so as not to force the fluid back into the perivenous tissue. We are careful not to release the pressure in binding on the pad, as shown in Figure 7. This pad we usually leave on until the following morning and the patient then removes it. For several years we insisted on the patients buying elastic bandages to wear over the entire lower leg during this treatment. We have abandoned this entirely unless the patient chooses to wear one for comfort.

We have tried the various methods on successive days and after one month attempted to distinguish between the results. After some time we concluded there was no method that gave better end-results than this method just described. The method is simple and requires a minimum of apparatus and lost motion.

#### COMPLICATIONS

The only complications we have observed were perivenitis and slough.

*Perivenitis.*—Perivenitis, so-called by the French, frequently worries the patient and at first worried us, and especially worried the medical man who by chance saw one of these patients before he was acquainted with this method of treatment. The area for some distance from the point of injection frequently becomes swollen, red, hard, feverish, and quite painful. Fortunately, we can usually truthfully tell the patient that the more marked these symptoms are, the more extensive are the results.

We usually advise hot applications and possibly some mild drug for the pain. Usually this does not give them trouble more than two or three days.

**Sloughs.**—Sloughs, we must admit, are due to faulty technic, but most of us who have followed this work for any great length of time have had them occur.

With the various sugar solutions, we have had practically no sloughs. With quinine hydrochloride and urethane, sloughs have been almost negligible. Sodium chloride, sodium salicylate and a mixture of dextrose and salt solution have given us our most extensive sloughs. Bichloride of mercury solution always gives a slough when injected perivenously but the slough is usually not so large as that produced by the other solutions just mentioned. If the solution escapes into the perivenous tissues at the time, the patient usually complains immediately of a local burning sensation. If we are in doubt we usually inject a large amount of novocain solution before sterile water. This usually dilutes the solution to such a degree that the slough is prevented. The inevitable slough usually shows up on the day following the injection. There is usually a dark bleb with a dark area underneath.

**Treatment of Sloughs.**—Usually the slough does not cause very severe pain unless infected. If infected, an Ochsner's pack will clear this up in two days. After four or five days the slough may be cut out to some extent without much pain, keeping within the area of necrotic tissue. We usually pack the cavity with gauze soaked with 1 per cent Dichloramin T. We are always careful to cover the skin with vaseline gauze to prevent irritation. The Dichloramin T usually dissolves away the necrotic tissue. After the necrotic tissue is dissolved away we dust on a little calomel powder and pull the edges of the ulcer together with adhesive.

These sloughs are slow to heal and a source of considerable annoyance to the patient. We hope some time to be able to avoid them.

**Ulcers.**—Our first work over eight years ago dealt only with patients who had already had ulcerations (Figs. 1 and 2). We then used the Unna cast (Fig. 8) in all cases until the ulcer was healed. We now use it only in the very extensive ulcerations. If the ulcer is not too large we use the sponge pressure method. This gives

us more rapid healing than we have observed with any other method.

If there is acute infection in or about the ulcers we put on the Ochsner pack for forty-eight

Method of compressing vein during injection.

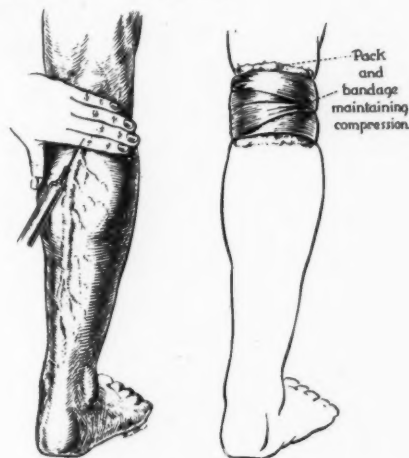


Fig. 6. (Left) Shows method of compressing vein to force out the blood during injection.  
Fig. 7. (Right) Pad bound on to maintain compression following injection.

hours. We then clear away any loose or sloughing tissue. If the granulation tissue protrudes above the epithelium at any point we touch this with a stick of silver nitrate. Silver nitrate should not be used otherwise. We then dust on a very light layer of calomel powder, cover the area with vaseline gauze, and bind the rubber sponge on very firmly. The elasticity of the sponge prevents shutting off of the blood supply below. The pressure forces out the fluid from the edematous area about the ulcer and produces a fairly normal appearing tissue.

We begin injecting the veins as soon as the patient is seen and continue until the varicose veins are all thrombosed. This hastens the healing of the ulcer.

#### THE TRENDLENBURG TEST

The Trendelenburg test for function of the deep veins is rather confusing as ordinarily described. We were much more concerned about it several years ago than we are now.

The history and general appearance of the leg will usually give one a fairly definite idea as to the function or absence of function of the deep veins. If there is any doubt, one should pro-

ceed slowly. One or two injections will rarely cause any great harm if the deep veins are thrombosed. If there is much swelling or edema after this injection, the work may be discontinued and

of changes already taking place in the intima. Occasionally a slough will result if the solution is injected directly into this point. If the injection is made at some distance from these points,

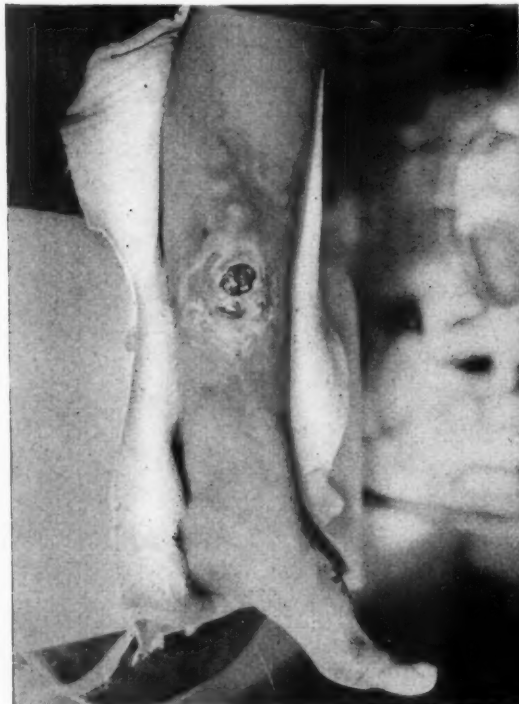


Fig. 8. The Una cast cut and turned back, exposing the healing ulcer.



Fig. 9. Could not demonstrate Trendelenburg test in this patient. Injection treatment gave very good results.

taken up later. If there has been a recent thrombophlebitis, no injection should be made.

#### SITE OF INJECTION

If there is an ulcer present, we usually aim to inject the vein in the immediate vicinity of the ulcer first. This will hasten the healing of the ulcer. In other cases we usually select the distal veins first if they are easily accessible; if not, we go higher and the distal may become prominent later. Each injection will ordinarily thrombose about three or four inches of the vein. Occasionally one injection will produce a very extensive thrombosis, possibly throughout the length of the vein (Fig. 5). We usually do not choose a site where the vein is too superficial. Frequently portions of the vein appear through the skin like a blue bleb. These points are usually not chosen for a site of injection. They are difficult to thrombose directly, perhaps because

the thrombosis may extend through them and give good results. We usually do not inject more than three or four inches above the knee except in very superficial veins. In the latter, we sometimes inject above the middle of the thigh.

#### FREQUENCY OF INJECTIONS

We usually arrange this about as the patient prefers. If the patient is in a hurry we may increase the number of injections at each session. The injections may be made every day, every second day, or once or twice a week, according to the resulting reactions. If the reactions are severe we usually give them a longer interval between injections. If the reactions are slight we do not hesitate to make daily injections.

#### RECURRENCES

It is frequently difficult to determine late whether canalization of the thrombus has taken



place or a branch previously unnoticed has become dilated. We have seen several patients, who had recently had surgical removal of varicose veins, return in a year or more with very prominent varicose veins. These evidently had not been considered at the time of the operation, but have become practically as troublesome as the original veins.

The same is true with this method, but here the patient will usually return for further treatment while in the case of surgical removal the patient seldom cares to submit to the second operation. In many instances, when the patient was relieved of all symptoms, he failed to return until he again had troublesome symptoms.

We cannot recall a single instance in which we were not able to thrombose the vein, nor have we failed to relieve the symptoms when we were certain they were due to varicose veins. In many instances we have failed to produce a thrombosis with a particular solution, and have resorted to the use of other solutions until the results were obtained. When we have thrombosed the prominent veins and relieved the patient's symptoms, we tell him to discontinue the treatment and return in from one to three months, or sooner if symptoms arise. We have had from 10 to 15 per cent of our patients return for further treatment. Some returned within six months; some returned from one to eight years later. No doubt the canalization of the thrombus had taken place in some cases, but for the most part it seemed that new varicose veins were the cause of the patient's return.

#### CONCLUSIONS

1. The sclerosing method of disposing of varicose veins has become the method of choice.
2. Many useful solutions have been employed for this purpose, but the ideal solution has not yet been brought out.
3. Practically every active patient, or one who

is not disabled by other disease, may have his varicose veins treated by this method if very cautiously done.

4. Emboli do occur. They are rare, but every possible precaution should be taken to avoid them.

5. The most troublesome complication now is the slough. This complication may be reduced to a minimum with extreme care.

6. We have not found any one particular solution applicable in all cases. If good results are not obtained with one, another may give the desired result.

7. The erect or sitting position, entering the vein in a distended condition, and then collapsing it with gentle pressure, is the simplest method. None has proven more effective in our hands.

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## AN ANALYSIS OF 100 CONSECUTIVE CASES OF BACK STRAIN\*

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**T**HIS clinical study was undertaken to determine the relative frequency and importance of the various findings in cases of back strain occurring in a private practice limited to diseases and injuries of the bones and joints. The cases were taken consecutively, and analyzed carefully as to history, clinical and x-ray examinations, treatment and results.

### INCIDENCE

*Sex.*—As might be expected, 70 per cent of the back strains occurred in males, due, of course, to their more hazardous occupations and greater muscular activity. While 30 per cent occurred in females, fourteen of these (or nearly one-half) gave no history of external violence. Postural back strains seem to be more common in women, as are strains due to work in the stooping position. In this series only 3 per cent followed parturition.

*Age.*—Strains of the back occur most frequently in early adult life, which is the period of greatest physical effort. The average age in this series was thirty-one and one-half years, but the range was from seventeen to sixty-six years of age.

### ETIOLOGY

Back strains are nearly always considered the result of trauma of some sort, yet in this series 25 per cent gave no history of external violence of any sort! Automobile accidents caused about 25 per cent of these cases, and the strains produced in this manner were usually the more serious. Other accidents of violence, such as occur in industrial or railroad work and the vigorous sports, accounted for 20 per cent. Heavy lifting or slipping while carrying loads caused an additional 10 per cent, while falls alone produced 13 per cent. Trauma, or external violence in the ordinary sense, then, was the etiological factor in 68 per cent of these cases.

Bending or working in a stooped position was considered the cause of the trouble by 6

per cent of these patients, and 3 per cent of them dated the onset back to parturition.

### SYMPTOMATOLOGY

All of these patients complained of aching, stiffness or pain in the lower back, and on this account they came for relief. The pain was usually described as diffuse over the lumbosacral region, but occasionally was more definitely limited to the right or left side. Pain radiating down the back of the hip, thigh, or leg, or around into the inguinal region was more rarely mentioned. The specific complaint of stiffness in the back was mentioned by 68 per cent of these patients. It is worth while to ascertain, if possible, what aggravated or relieved the pain. The location, character, and distribution of the pain should be determined so far as possible.

In private practice, however, the examiner must sometimes look askance at subjective complaints relating to the lower back until he learns whether or not there is compensation or litigation pending. In this series 36 per cent of the cases were either involved in compensation claims or were in some way connected with litigation. One tends to evaluate the subjective complaints differently in such cases unless the objective findings seem to agree.

### OBJECTIVE FINDINGS

List, or lateral deviation of the spine as a whole, is the first sign noted on examination of the patient. Inspection must include the entire posterior surface of the nude body to be of any value. A list appeared in 23 per cent of these cases (due to a short leg in 2 per cent). The list is usually away from the side complained of, but occasionally is toward the sound side. Smith-Petersen believes that a list results from the patient's attempt to avoid transmission of weight through the affected side, and is due to muscle spasm. This was certainly true in 13 per cent of these cases, but in the additional 10 per cent presenting a list there seemed to be little or no muscle spasm

\*Read before the American College of Physicians, Minneapolis, February 14, 1930.

demonstrable. We interpret some of these lists as having a mechanical derangement of one of the small postero-lateral articulations of the lumbo-sacral joints. By this is meant actual overriding of one articular facet on its fellow with locking in the dislocated position,

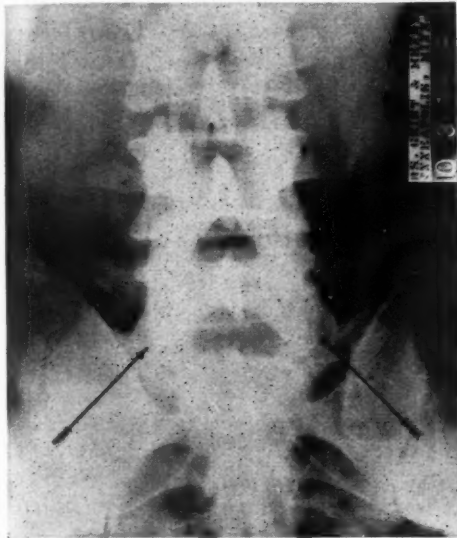


Fig. 1. Normal spine (note position of postero-lateral articulations).

back strains appeared in women three times as often as in men, and, when appearing in males, the individuals were always of poor muscular development.

Crepitation was definitely present in 4 per cent of the cases. This is always sought for



Fig. 2. Unilateral abnormal variation of articulations, with list.

or pinching of the synovia, capsule, or ligaments of the joint in the rebound of these articular surfaces when they have been displaced beyond their normal limits of motion. Such derangements are not demonstrable roentgenologically because these cases always have "abnormally placed" articular facets, that is, the small postero-lateral lumbo-sacral joints are congenitally placed facing antero-posteriorly instead of mesially as is considered "normal" in this region. In this series every patient presenting a list also had so-called "abnormal" articulations, except one patient who had a short leg.

Faulty posture was noted in 20 per cent of these cases; and by this term, we include only Class D postural ratings according to the Boston classification; that is, extreme exaggeration of the normal spinal curves, with flat chests and prominent abdomens. Under this heading, other defects in statics are included as well as deformities, but none of importance obtained in this series except two mild cases of scoliosis. It is interesting to note that postural

when testing range of motion of the first time. It can usually be palpated over the lumbar region, but is sometimes rough enough to be audible as well. Of course, this finding occurs oftener in older individuals but is sometimes present in younger adults with arthritic tendencies. It is not always found in cases presenting definite spurs and lipping on x-ray, and, on the other hand, may be found in cases having "normal" roentgenograms.

Limited motion is the most important and reliable sign in cases of back strain, and was present in 47 per cent of this series. Range of motion was first checked in flexion, extension, side bending and rotation with the patient standing and not bending his knees. The range of flexion was then re-checked in the sitting position because the muscle spasm often relaxes in the sitting position in sacro-iliac cases. Limited motion is usually due to muscle spasm—reflex splinting to protect the injured parts of the back and prevent pain—but, of course, spondylitis limits motion whether appearing alone or with strain superimposed. In the lat-

ter type of limitation, the x-rays are helpful in disclosing arthritic changes, antecedent fracture, tuberculosis, spondylolisthesis, etc., which conditions per se are not included in this analysis.

Muscle spasm, as a definite objective sign,



Fig. 3. Unilateral sacralization, with spina bifida occulta.

was present in 16 per cent of these cases. It was undoubtedly present in more of the cases, and accounted for limited motion and list, but was not noted by the examiner. Personally, I often find it difficult to ascertain with certainty in muscular and obese individuals unless supported by limited motion, list, or positive leg signs.

The straight-leg-raising-test was positive on one or both sides in 27 per cent of these cases. This test transmits leverage through the hamstring muscles to the patient's lower spine, and, if applied carefully, it is of great value in demonstrating muscle spasm. As the patient's leg is raised straight from the table, the examiner's other hand should be placed beneath the lower spine, where the reflex spasm can be felt concomitant with the onset of pain before the lumbar spine begins to move. In cases of unilateral sacro-iliac strain, this sign is positive at a lower elevation of the leg on the affected side than on the sound side, while in cases of lumbo-sacral strain, the sign is apt

to be positive on both sides at the same elevation. This test is also valuable because it is difficult to simulate if carried out properly and carefully.

The cross-leg-rocking-test is valuable because it confirms information gained by the above tests. In this test, the knee is flexed so that the ankle rests on the opposite knee of the recumbent patient; then downward pressure is simultaneously applied to the flexed knee and the opposite pelvic spine. The psoas muscle and the Y ligament of the hip are thus utilized as a lever to rock the pelvis. Response to the test is complaint of pain, and being a subjective test, this is less reliable. However, the test is valuable because being less frequently employed, it is less frequently simulated. This test was positive, that is, produced complaint of pain, in 19 per cent of this series.

The other leg signs and sacro-iliac tests, such as crest compression, pressure over the symphysis pubis, Ely's sign, Gaenslen's sign, and palpation per rectum, were employed too seldom to be included in this analysis. They are, however, of great value in differentiating lumbo-sacral and sacro-iliac strains.

Tenderness was present in 66 per cent of these cases. As a sign it appeared most frequently, yet is probably of least value unless the examination be systematic and thorough. In palpating for tenderness the patient had best be placed prone over the end of the table so that his legs hang free. This position removes much of the lumbar lordosis and offers better opportunity for identification of bony landmarks. Tenderness is sought first over the sacro-iliac joints, then over the sciatic notch, next over the ilio-lumbar ligaments, next over the spinous processes and interspinous ligaments, and lastly over the dorsum of the sacrum. Points which seem to be sensitive are marked on the skin, and later checked to eliminate simulation.

Short leg presented in 2 per cent of this series, just frequently enough to remind one that measurement of the legs is a part of a complete examination of the back.

#### X-RAY FINDINGS

Every case in this series was studied with stereoscopic antero-posterior and lateral roentgenograms, and 80 per cent showed some sort



of so-called "congenital abnormality," or anatomic variation.

Abnormally placed postero-lateral articulations appeared in 63 per cent of the cases—too high a percentage to ignore or consider as coincidence. As mentioned above, nearly

having this variation are inherently weak because of the restriction of motion (Fig. 3.)

Spina bifida occulta occurred in 7 per cent of this series, and lack of fusion of laminae occurred in an additional 3 per cent. Persons having this variation are obviously more sus-



Fig. 4. Osgood back brace.



Fig. 5. Goldthwait back brace.

every patient having a list showed "abnormal" articulations. While the facets of these articulations between the fifth lumbar vertebra and the sacrum are somewhat crescentic, nevertheless the major portion of the articulation faces medially in the normal spine as pointed out by Goldthwait (Fig. 1.) In a large proportion of spines studied roentgenologically these small diarthrodial joints are seen to face more antero-posteriorly, and are called "abnormal," or variations (Fig. 2.) Dickson, Bohart, and others, studying large series of backs roentgenologically, report variations present in 35 to 44 per cent of all spines. In this series of 100 cases diagnosed "back strain," however, the percentage is much higher—63 per cent showing abnormal facets and 80 per cent some congenital variation. This seems adequate basis for reasoning that such backs are either more susceptible to strain, or recover more slowly from the effects of strain.

Sacralization appeared in 5 per cent of this series, either unilaterally or bilaterally. Spines

ceptible to strains, especially the muscular type, because the membrane closing the defect offers a weaker origin to the muscles arising from it. While spina bifida occulta is one of the commoner congenital variations and does predispose to strains, the injury occurring in these cases usually responds rapidly to treatment.

Scoliosis of a mild type was revealed by the roentgenogram in 2 per cent of this series. Except as this condition alters the statics of the spine slightly, it does not seem to figure prominently in predisposing to strain.

Sprain fracture appeared in 2 per cent of these cases, as a tiny chip pulled off the anterior margin of the vertebral body.

Arthritic changes were revealed by x-ray in 5 per cent of these cases. Insurance companies know this to be one of the most bothersome findings. "Pre-existing dormant arthritis, aggravated by injury" has become a common expression.

Antecedent disease such as healed tubercu-

losis, or healed fracture, was found in 8 per cent of these cases, a large enough proportion to suggest that the fusion of even a small portion of the spine constitutes a permanent disability which may slightly predispose to subsequent injury.



Fig. 6. Plaster-of-Paris jacket. (Note felt pad for axilla.)

#### TREATMENT

The various forms of treatment are applicable to widely different types of cases, and consequently the methods employed require explanation only in general.

Physiotherapy was employed in all of these cases either by the patient himself or a trained physiotherapist. Local heat, either by electric pad, radiant light, or hot packs was usually applied. Baking and massage was given in many cases, but none of this series happened to receive diathermia. We believe diathermia of great value in acute strains of all sorts, and find it of great value for relief of pain in such cases.

Rest alone (or supplemented by no other treatment than adhesive strapping) was used in 6 per cent of these cases. By this is meant absolute rest in bed, usually with pillows supporting the knees to relax the hamstring muscles. All of these patients, however, were instructed to avoid bending, stooping, and lifting during the period of treatment, and usually

were cautioned to avoid the jolting of vehicles.

Foreign Protein Injections were employed in 2 per cent of the cases. This is done in those special cases where the arthritic habitus of the patient seems to warrant such treatment. It is always carried out in a hospital by a competent internist. In both of these cases this treatment seemed beneficial, but not entirely curative.

Correction of short leg was used in 2 per cent of the cases. The correction employed is a one-half inch lift on the outside heel of the shoe, adding the remainder necessary for correction by an inner heel. If the difference in length is more than three inches a high sole is employed.

Postural correction was given in 12 per cent of the series. Correct mechanical use of the body was explained to the patient; postural rests and corrective exercises were given. Some of these cases were recorded at the first visit with the Schematograph, and later tracings made from time to time to check progress.

Braces were used in 61 per cent of these cases. The type of brace varied from the leather sacro-iliac belt having perineal straps, to the Osgood, or "butterfly," brace having axillary crutches to take the weight on the iliac crests (Fig. 4). The brace most frequently used was the spring steel brace of the "Boston" or Goldthwait type (Fig. 5.) This is a highly efficient brace for the ordinary case, being quite comfortable if properly fitted.

Plaster of Paris jackets for more complete and certain immobilization, were employed in 8 per cent of these cases. Usually they were applied after manipulation under anesthesia and were worn during the period of rest in bed and after the patient was ambulatory. For cases of back strain they are always applied with the patient supine on the Goldthwait irons. Only very little padding can be used if jackets are to be efficient—just enough to protect bony prominences and not interfere with accurate fitting (Fig. 6).

Manipulation under anesthesia was used in 10 per cent of these cases. Ethylene anesthesia was employed, and only those cases having a list with possible mechanical derangements of joints were manipulated. We attempt to carry the spine through the normal range of motion with the muscle spasm relaxed by anesthesia.

The straight leg raising of Baer is used to flex the pelvis on the spine. This is not an exact method of treatment, but we have had no untoward results, and some brilliant results.

The operation of spinal fusion was done in 4 per cent of these cases. Naturally it is done

in condition seems to be recurrent, depending either upon the exigencies of their work or play.

At their last office visit 30 per cent of this series reported improvement but not complete cure. We believe that this group improved sufficiently later.

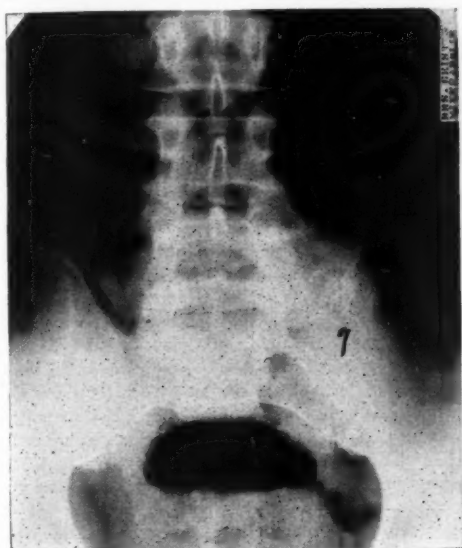


Fig. 7. Post-operative spine (in unilateral sacralization). (Same case as Fig. 3.)



Fig. 8. Post-operative spine (note new bone formation 6 months post-operative).

only in severe, chronic cases, after all other forms of treatment have failed. The exact type of operation used is a modified Hibbs' operation, to be reported shortly. Usually the last three lumbar vertebrae are fused to the sacrum (in lumbo-sacral cases, no sacro-iliac fusion appeared in this series (Figs. 7 and 8). The results have been satisfactory to the patients in all of these cases thus far.

#### RESULTS

An analysis of the results in these cases seemed at first disheartening, for the end results were unknown in 29 per cent. Many of these were patients involved in litigation, however, who were unable to utilize our report of opinion on their condition as they had anticipated. Undoubtedly, some of this unknown group sought relief elsewhere or were perhaps disgruntled or dissatisfied with the treatment received. Some of them were referred to charitable institutions, and some have moved.

In 71 per cent, however, the end results are at hand. Of these, 4 per cent are definitely unimproved to date. In two of these the con-

dition seems to be recurrent, depending either upon the exigencies of their work or play.

#### SUMMARY

1. An analysis of 100 consecutive cases of back strain is given and a summary of the physical findings is appended herewith.
2. Back strains are most common in early adult life, and are usually due to external violence, although 25 per cent of this series gave no history of trauma.
3. A "list" of the spine is a very reliable sign, and is due to muscle spasm or mechanical derangement in anatomic variations of the lumbo-sacral joints.
4. Limitation of motion of the back, and the "leg signs," are valuable aids in diagnosis.
5. Congenital anomalies appeared in 80 per cent of the series, indicating that such backs are predisposed to strain.
6. Most cases were relieved by rest or mechanical support and fixation, although several required fusion operations to gain permanent relief.

# CASE REPORTS

## A CASE OF MYXEDEMA AND DIABETES\*

JAMES B. CAREY, M.D.  
Minneapolis

The combination in one person of myxedema and diabetes mellitus is apparently quite rare. Only four cases have been reported in the literature to date. One case was reported by Wilder,<sup>1</sup> in a child; one by Jamieson<sup>2</sup>; and two by Wright.<sup>3</sup> It is interesting to note that all of these patients either had the diabetes first, and subsequently developed myxedema, or the two conditions occurred simultaneously. In the case reported in this paper, the myxedema antedated the diabetes by six years.

Wilder's case was that of a child who had diabetes at the age of 15 months, and who subsequently became myxedematous at three years of age. The diabetes had been under very careful control, but when an attempt was made to raise the low metabolic rate, consequent to the myxedema, by the use of thyroid substance, the diabetes became more marked. But when thyroid substance was discontinued, in order to control the diabetes, myxedema symptoms returned.

This also seems to have been the experience of the other men who reported three cases, all of which concerned adult patients. Jamieson's case had a history of diabetes antedating the onset of myxedema symptoms, but when first seen and examined, both conditions were found to be present. The original sugar tolerance curve was fasting .131, 3 hours, .185. After 13 days, thyroid medication brought the original low basal metabolic rating up to normal; the sugar tolerance had diminished, i.e., fasting .284, 3 hours, .343. Thyroid was discontinued for one week and the curve still remained high, .254 and .349 in 3 hours with a basal metabolic rate of -11%. Thyroid was further withheld for one month, reducing the basal metabolic rate to -41%, and the fasting blood sugar then had reduced to .192. A standardized procedure of diet, insulin and small doses of thyroid was then agreed upon; the attempt being made to keep the metabolic rate moderately low, and the blood sugar within reasonable bounds.

Wright's cases, also adult patients, are quite similar. In both cases the individuals had diabetes before the onset of evident myxedema. After the establishment of the myxedema, the diabetes was much more difficult to control, as Jamieson's and Wilder's experiences revealed.

### REPORT OF CASE

A. W. S., male, aged 44 years, appeared for examination June 28, 1927, complaining of weakness, aching

legs, and shortness of breath. He stated that in March, 1920, he began to feel general malaise, was easily fatigued, and had some aching of legs and dyspnea on exertion. He had been treated for pyorrhea at that time without relief of symptoms. Upon questioning it was brought out that he had suffered from impairment of visual acuity; his mental processes were considerably retarded; and his hearing, especially, had become quite poor. He found it almost impossible to keep awake, and would usually fall asleep anywhere if he remained in a sitting position for any length of time. He had gradually gained in weight, and his flesh had become soft. He had become stooped, and "round shouldered" during the past year, and experienced great difficulty in holding his head erect. His hair had become dry and had fallen out; his skin was dry, although he perspired readily. There had been some swelling of the legs from the knees down, which did not vary greatly on change of posture. His wife further stated that his pulse had become slow, being about 50 when she had counted it. The family and past history was unimportant. He had two children, and his wife had had two miscarriages, both at about six weeks.

Examination revealed a dry, scaling skin, thin dry hair, and scaly scalp. The face was puffy, especially around the eyes, and the color was rather pale. General musculature was flabby, with an increase of fat deposit at the back of the neck and on the abdomen. The pulse was slow (50-56), full in volume, but of low tension. Respiration was also slow. As the individual was questioned, his attention wandered; his speech was slow and thick, and his answers were often inaccurate when checked by his wife. The eyes were negative, except for a drooping of the upper lids. The examination as to heart, lungs, abdomen, was entirely negative. The reflexes in the extremities were sluggish. There was no true edema, but a typical myxedematous palpatory sensation of the subcutaneous tissue was present. The first blood pressure reading was 108/80. Important laboratory findings at this original examination were, a negative urine, a negative blood Wassermann, and basal metabolic rate of -36 per cent. He was placed on 6 gr. of desiccated thyroid substance daily, and his subsequent course can be readily seen by the accompanying chart. There was the expected symptomatic improvement, and from 1922 to 1928 he was not seen, although we corresponded with him at intervals.

During the winter of 1927, he developed symptoms of diabetes, that is, he lost weight rapidly, had great hunger, thirst, and weakness. The doctor in the town to which he had moved found sugar in his urine. There was great difficulty in establishing a proper balance between diet, glycosuria and thyroid dosage. Finally, in August of 1928, he returned to the Clinic for examination and management. At this time he was found to be thinner than before, and without any sign

\*From the Department of Medicine of the Nicollet Clinic. Read before the Minnesota Society Internal Medicine, May 26, 1930.



or symptoms which one could identify as being myxedematous. His pulse rate was slow, his blood pressure 120/80, and his basal metabolic rate was -17 per cent. Again his course can best be followed by reference to the accompanying chart.

At the present time, the patient is not very coöperative, and insists upon an adequate daily food intake as he must continue his work as janitor. He will not re-

Fitz<sup>4</sup> had already found that a non-toxic goiter had no influence upon diabetes. Holst<sup>5</sup> has seen a diabetic condition occur after thyroidectomy on an exophthalmic goiter during a remission. Two and one-half years later this same patient became myxedematous, and the diabetes cleared up. Wilder<sup>1</sup> further states that there are numerous instances of myxedema occurring in diabetes, resulting in an improvement of the

Date	Basal Metabolic Rate Per cent	Wt. Kg.	Blood Sugar Per cent	24 hour urine sugar gram	Thyroid substance per day gram	Insulin Units Per Day	Diet General
6/29/21	-36	75.8			6		
10/ 3/21	-6	66.0			4-6		
4/ 3/22	+2	76.4			4-6		
8/28/28	-17	70.0	.174		4	15	Carbohydrate, 110 Protein, 70 Fat, 180
9/ 1/28				33	2	30	
9/14/28	+27	66.0		4	2	30	
10/ 5/28				3	2	30	
10/18/28	+7	69.0			2	30	
12/20/28	+12	67.0		13	2	30	
7/17/29	+1	58.0	.285		2	30	
3/31/30	+11	60.0	.222		2	30	
4/ 4/30				8	2	35	

Chart indicating patient's condition.

port at regular intervals for checking up, but usually comes in when either he or his wife are worried about something.

We have tried to eliminate the thyroid substance, thinking that perhaps the diabetes might be better controlled if we allowed the basal metabolic rate to drop to 10 or 15 below normal. The patient, however, has a great fear of relapsing into his previous lethargic state, and insists upon taking a small daily dose of the substance. During the time when he was first found to have diabetes, he had a few unfortunate insulin reactions, and has developed some fear of an over dosage of it. Perhaps, due to the peculiar combination of things, in this case, these personal factors are not very important, but they are recorded as a possible explanation for the difficulty in controlling the diabetic factor. If the basal metabolic rate could be allowed to drop below normal, and the man would consent to either limiting his food intake, or increasing his insulin dosage, perhaps the balance could be better maintained.

#### DISCUSSION

According to Joslin and others, diabetic patients when first seen usually present an increased basal metabolic state, about +20 per cent being average. This rate is generally reduced to -10 per cent or so after the patient is placed upon proper dietary management. It has been thought that this reaction is no more than a chemical metabolic effect of food.

Wilder has stated that the presence of the exophthalmic goitre syndrome reduces the ability of the diabetic individual to utilize carbohydrate, decreases the efficiency of a unit of insulin, and increases the danger of sudden onset of diabetic coma, while the control of the hyperthyroidism by iodine markedly improves the carbohydrate tolerance. These deductions, based upon observation of the behavior of diabetics with hyperthyroidism, must be applied to our present problem.

carbohydrate tolerance, but he does not state any specific cases other than those already mentioned, nor does he give further references. All of which seems to indicate that with low metabolic rate, the tissue cells are able to utilize a given amount of glucose with less insulin than they require when the metabolism is pitched at a higher rate.

Gardiner-Hill, Brett, and Smith<sup>6</sup> give blood sugar curves in 15 myxedema patients which are seen to reach a higher peak and to be more greatly prolonged than normal. In spite of this, glycosuria was rare in their studies. In general, the fasting blood sugar was normal. Thyroid extract given to these patients did not raise the fasting blood sugar, and the general effect on the curve itself was to lower the peak and quicken or shorten the curve.

Janney and Isaacson<sup>7</sup> found that the fasting blood sugar could be reduced in animals by removing the thyroid from them. Gray<sup>8</sup> found low blood sugar values in 8 cases of myxedema. Other authors quoted by these men confirm the same findings.

In conclusion it must be evident that when diabetes is present in an individual who has a low metabolic rate, one who is, in other words, myxedematous, the raising of that low rate by thyroid substance produces the same result upon the diabetes as occurs when a diabetic patient with a normal basal metabolic rate develops hyperthyroidism. What has not been evident before, but which seems to be brought out in the case presented, is that the presence of the diabetes also does something to the myxedema, that is, less thyroid substance is needed to maintain a normal metabolic rate after the onset of the diabetes than was necessary before.

1009 Nicollet Avenue.

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### RETROPERITONEAL HERNIA

#### REPORT OF CASE

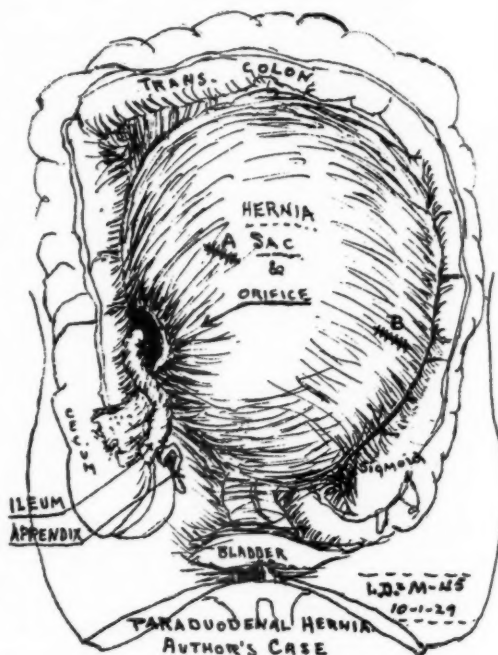
FRED H. STANGL, M.D.  
St. Cloud, Minnesota

An investigation of the literature reveals that the incidence of retroperitoneal hernia is relatively rare, and that to date the total number of reported cases does not much exceed two hundred. These herniae may be divided into four groups, namely, duodenal, periceal, intersigmoid and those through the foramen of Winslow.

The hernia here reported is of the paraduodenal type, which is the most common. This hernia was encountered in the course of a postmortem examination made for the purpose of locating bullet wounds of the abdomen. The individual was a forty-five year old male laborer who had never had any complaints which were referable to the presence of the hernia. Death resulted from bullet wounds of the abdomen which had caused shock, hemorrhage and peritonitis. A surgical repair had been attempted soon after the wounds had been inflicted but only the hernia sac had been sutured, the impression, according to the surgeon, being that the sac was hemorrhagic distended bowel.

At necropsy, when the abdomen was opened, it was found entirely void of small intestines and the major

portion of the abdominal cavity was occupied by the large tumor mass as shown in the accompanying illustration. The membrane covering the herniated small intestines was neither transparent nor translucent and was made up of dense fibrous tissue from 5 to 7 mm. thick. When the cecum was pulled laterally, a small



portion of the distal ileum was found which coursed upward from the ileocecal valve to enter an orifice just at the side of the cecum about half way between the caput coli and the liver. Two recently catgut-sutured defects in the anterior hernia wall were encountered at the sites indicated by "A" and "B" in the illustration. Within the hernia sac the small intestines were much matted together by old fibrous adhesions and there was everywhere present much bowel content, dark purple fluid and clotted blood, and fibrino-pus. Several large lacerations were present in the loops of small intestine from which the content had escaped and where the hemorrhage had occurred.

### EKA SALT AND THE SALT FREE DIET

Eka salt (claimed to contain sodium malate as its essential constituent) is offered as a means of giving the same flavor as common table salt without making it necessary for the body to deal with the ten or fifteen grams of sodium chloride that would ordinarily be taken. Since no one knows whether the sodium or the chloride is responsible for any of the untoward effects attributed to sodium chloride, it would not be proper to include Eka salt in a diet that is intended to be strictly salt free. (*Jour. A. M. A.*, June 7, 1930, p. 1859.)

### YEAST

Yeast has so uncertain a laxative effect that it is hardly justifiable to class it among the cathartics. It might more appropriately find a place among the laxative diet factors alongside bran, honey and prunes. Its content of vitamin B makes it of specific value in skin eruptions due to vitamin B deficiency, such as those occurring in pellagra. That it is of much value in other skin troubles, such as acne or furunculosis, is doubtful. The history of yeast suggests that it has a therapeutic value, but that this value is slight indeed. (*Jour. A. M. A.*, June 14, 1930, p. 1939.)

## NEW AND NON-OFFICIAL REMEDIES

The following articles have been accepted by the Council on Pharmacy and Chemistry:

CAREL LABORATORIES

Alpha-Naphco

ELI LILLY & Co.

Ampoules Glucose (Dextrose, U.S.P.) Lilly 50 Gm., 100 c.c.

MALTBIE CHEMICAL Co.

Ephedrine Nasal Jelly-Maltbie

MEAD JOHNSON & Co.

Mead's 5 D Cod Liver Oil with Viosterol

MERCK & Co., INC.

Pyridium

Aqueous Solution of Pyridium, 1 per cent

Pyridium Tablets, 0.1 Gm.

Pyridium Ointment, 10 per cent

H. A. MATZ LABORATORIES, INC.

Elixir of Pyramidon

Pyramidon Tablets, 1½ grains

NATIONAL DRUG Co.

Ragweed Pollen Antigen-National

Timothy Pollen Antigen-National

PARKE, DAVIS & Co.

Ephedrine Hydrochloride-P. D. & Co.

Capsules Ephedrine Hydrochloride-P. D. & Co.,

¾ grain

Capsules Ephedrine Hydrochloride-P. D. & Co.,

¾ grain

Parke, Davis & Company's Cod Liver Oil with Viosterol 5 D

Thio-Bismol

Ampoules of Thio-Bismol

PITMAN-MOORE Co.

Siomine Capsules, ½ grain, 1 grain, 2 grains, 5 grains

SANDOZ CHEMICAL WORKS, INC.

Scillaren

Tablets Scillaren

Solution Scillaren

Scillaren-B

Ampules Scillaren-B

G. D. SEARLE & Co.

Ampules Mercurochrome-H. W. & D., 1%, 10 c.c. and 20 c.c.

NONPROPRIETARY ARTICLE

Alphanaphthol

### TRUTH ABOUT MEDICINES

#### FOODS

The following products have been accepted by the Committee on Foods of the Council on Pharmacy and Chemistry of the American Medical Association for inclusion in Accepted Foods:

*Nouron* (Nouron Products Corporation, New York).

—The ingredients used in the manufacture are soy beans, whole wheat flour and egg yolk. It is claimed to be a nutritious, digestible and palatable food prepared especially for assisting in the gradual change

from a liquid to a solid diet, as for weaning babies and for convalescents.

*Merrell-Soule Whole Lactic Acid Milk Powder* (Merrell-Soule Co., Inc., New York).—It is made from fresh whole milk. It contains fat, 28 per cent; protein, 26.5 per cent; lactose, 32.5 per cent; mineral matter, 6 per cent; total acidity, 5 per cent; free lactic acid, 4.25 per cent; moisture, 2.25 per cent. It is prepared from pure whole milk inoculated with a culture of *Streptococcus lactis*. This product is claimed to have the value of freshly prepared lactic acid milk.

*Jell-O* (The Jell-O Co., Inc., Le Roy, N. Y., General Food Corporation, Successor).—A mixture of pure gelatin, cane sugar, pure fruit flavor, fruit acid from grapes and vegetable color.

*Carnation Milk* (Carnation Milk Products Company).—Cow's milk reduced to consistency of cream by evaporating in vacuum and then sterilizing. It contains the vitamins that any cooked milk is depended on to supply.

*New Oats* (Ralston Purina Co., St. Louis).—It contains rolled oats and precooked rolled wheat. It is claimed to provide iron, phosphorus and the constituents of these grains in a form permitting rapid cooking.

*Purina Whole Wheat Flour* (Ralston Purina Co., St. Louis).—It is composed of whole wheat. It is claimed that the product is rich in iron, phosphorus and other minerals.

*Checker-Corn Flakes* (Ralston Purina Co., St. Louis).—It is claimed to provide flavor and variety appealing to the appetite.

*Ralston Wheat Flakes* (Ralston Purina Co., St. Louis).—It is composed of whole wheat, claimed to provide nourishing food in appetizing form.

*Ralston* (The Whole Wheat Cereal) (Ralston Purina Co., St. Louis).—It is choice hard winter wheat, containing the wheat embryo, with its vitamins. It is claimed that the whole wheat berry supplies the elements for healthy growth. (Jour. A. M. A., June 14, 1930, p. 1919.)

### MODILAC NOT ACCEPTABLE FOR N. N. R.

The Council on Pharmacy and Chemistry reports that Modilac is the proprietary name under which the Wm. S. Merrell Co. markets a compressed tablet containing milk sugar and some salts, recommended for the "humanizing" of cow's milk to render it suitable for infant feeding. In 1925 the Council held Modilac not to be within the scope of New and Non-official Remedies because no medicinal claims were made for it, and included the product in the list of exempted articles. From an examination of the present advertising it appears that medicinal claims are now being made for the product, thus bringing it within the scope of New and Non-official Remedies. These claims were found to be unacceptable and therefore the Council voted that the exemption of Modilac be rescinded and that it be considered unacceptable for New and Non-official Remedies because it is an unscientific mixture of official articles marketed under a nondescriptive proprietary name and with unwarranted therapeutic claims. (Jour. A. M. A., March 8, 1930, p. 716.)

## PRESIDENT'S LETTER

THE big state meeting has come and gone. All who took an active part in contributing to its success are, we may be sure, glad of the chance to relax. They are thinking, quite in unison with everyone else, that this is vacation time, the good old summer time.

Doctors need periods of relaxation and recreation rather more, perhaps, than people in other fields of work, for their responsibilities are more numerous, more direct, and the tension under which they live is greater than is the case in most other callings. Few people realize that the doctor is something of a prisoner with many wardens, to each of whom he is responsible. Never may he be out of reach; always he must be subject to call. The feeling of being tethered makes him long for vacation freedom. His thoughts at this season instinctively turn, in spirit if not in fact, to that first of all great anglers, Izaak Walton.

Occasionally a babe is born into the world whose name is destined to live in the minds of posterity over long periods of time. Some of such are remembered because of the exercise of great power, usually in connection with affairs of state, exercised for weal or woe. Others are remembered because of contributions to science or discovery, or because of unusual philosophical genius. The ones who are remembered best and longest are they who have contributed notably to the real betterment and happiness of mankind.

We all contribute something to life as we journey through, but he whose name endures over the brief span of one hundred years is an exception. Therefore when we find a name that has lived upwards of three centuries it arouses our interest.

The name of Walton comes to mind again in this connection. He was born in the last decade of the 16th century and he lived to the ripe old age of ninety years. He appears to have been a man of considerable acumen, for he was able to retire from gainful work at the age of fifty-one. Thereafter he devoted much of his time to fishing and some of it to writing. Evidently he was not a very ambitious man, as we would define that term today. The few biographies he wrote, of his contemporaries, would hardly entitle him to lasting fame, yet his name endures, due, no doubt, to his one masterpiece, "The Compleat Angler, or The Contemplative Man's Recreation." As we read this book we learn, without realizing it, to know what kind of man he was. We come to feel intimately acquainted with him, and with his fish, and with the scenes of his activities. We feel the warmth of a sunny disposition. He knew the value of rest and recreation, of time used for cultural purposes. He loved beauty, and he enjoyed life in the truest sense. The message he gave to posterity was one of beautiful pen pictures of natural scenes, a quaint philosophy of simple life, the joy of friendly conversation, the value of earnest endeavor and the importance of happy understanding.

This celebrated fisherman would have made a great doctor, for he knew the needs of both body and mind and he understood the yearnings of the human heart. He loved to meditate and he was truly a great philosopher. We doctors may well turn to him to learn something of how to fill our lives, and the lives of others, with happiness.

This is vacation time and we continue to go about our accustomed work, fettered by duty. We all should heed the message his voice is whispering across three hundred years of time: "Go fishing! And learn to be a philosopher."



President,  
Minnesota State Medical Association.



# EDITORIAL

## MINNESOTA MEDICINE

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Vol. XIII August, 1930 No. 8

## ETIOLOGY OF THE COMMON COLD

Newspapers have announced that J. A. F. Pfeiffer of the University of Maryland School of Medicine has discovered the cause of the common cold. Before this announcement Dr. Pfeiffer had written two short preliminary reports<sup>2,3</sup> on an organism that he believed to be the cause of colds. It seems likely that the notice in the newspapers is concerned with the same organism. If so, it is a Gram-positive coccus with cultural characteristics that distinguish it from other cocci. It is said to produce colds in man and animals experimentally, to cause fixation of complement in high dilution, and to produce immunity through vaccination.

It should be pointed out, however, that even though one organism can be shown to produce the symptoms of the common cold, other organisms may, also, produce them. There are strong reasons for believing that the common cold represents merely a non-specific reaction to infection of the nasal mucosa with a number of different organisms. Among the reasons for holding this view are several facts. Different symptoms accompany different epidemics of colds. One may be characterized by headache, another by extreme prostration, another by earache, and still others by bronchitis or neuritis. The complications may vary similarly. One season brings infection of the mastoid processes, another, disease of the nasal sinuses, and another, albuminuria. Perhaps the strongest argument for multiple origin is to be found in the results of bacteriologic examination of the complicating lesions. For instance, otitis media complicating colds in the head may yield pure cultures of streptococci, pneumococci, Friedlander's bacilli or any one of several other organisms. The predominating organisms in colds have been studied in different seasons and in different places. They vary markedly.<sup>1,4</sup> The nasal mucosa may be infected by the organisms of diphtheria, scarlet fever, measles, influenza and epidemic meningitis. Were it not for symptoms elsewhere in the body, these serious illnesses would be only severe colds. Conjunctivitis may be caused by the streptococcus, the pneumococcus, the staphylococcus, corynebacteria, the Koch-Weeks bacillus and the Morax-Axenfeld organism. It scarcely seems reasonable to suppose that the milder nasal infections are all caused by a single coccus.

If Pfeiffer has discovered the only cause for the common cold, he has made one of the most notable discoveries in modern medicine. If his organism proves to be only one of the causes, nevertheless he has made a valuable contribution.

ANDERSON C. HILDING, M.D.

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### SAVING THE TAXPAYERS

"When a hospital is owned and operated by government and supported by taxation, to which the medical profession contributes its due proportion, medical attendance should be paid for by taxation, along with all the other facilities supplied by the institution."

The above quotation from the address of the President-elect of the American Medical Association, Dr. William Gerry Morgan, at the Detroit session, seems reasonable. The precedent, however, seems to have been established that physicians donate their services to state and city tax supported institutions and consider the time and effort donated fully compensated by the increased experience gained. Whether the profession in any locality decides to act on the suggestion quoted above and to cease donating its services, depends on the feeling of the physicians in any particular locality.

In an effort to lighten the load of hospital maintenance to taxpayers, certain city and state hospitals in Minnesota have added the part-pay system whereby the patient pays for his hospital care at a rate commensurate with his ability to pay. The rate varies from \$4.00 per week up. The services of the staff physician are thus donated to an additional group of patients who can only pay for hospital care or some fraction thereof. This group is one that is likely to grow and in certain instances has grown to such an extent as to add considerable to the sum total of patients treated gratis.

Not to seem penurious we fail to see why physicians should extend their charity to include the part-pay hospital patient in order to save the taxpayers (physicians included) what amounts to thousands of dollars annually.

There are other phases of the situation which lead only to confusion. The part-pay patient's

stay in hospital is a matter of financial concern to him, a matter which the attending physician is likely to overlook. His next-door neighbor is receiving the same hospital care at no cost.

The distinction between the indigent patient and the pay patient should be sharply drawn. The matter should be taken up by the local medical society unit concerned, as the continuation of the practice lies in its hands.

### PREVENTIVE INOCULATION AGAINST DISEASE

The progress in the immunization against disease has been made so rapidly that it is well to take stock and determine what procedures have been definitely proven of value, what measures are still in the experimental stage, and what measures that promised well have been definitely abandoned.

In any program of this character it is important to emphasize that the prevention of smallpox by vaccination is still the outstanding contribution in this field. Vaccination alone accounts for the fact that we no longer have smallpox constantly in our midst and by vaccination alone can we continue this state of affairs. All infants should be vaccinated between the sixth and twelfth month of life and this should be repeated every five to seven years thereafter. The vaccination should be done by pin prick, then a drop of vaccine placed in the skin, then wiped off and no covering or bandage of any kind applied.

Second only to smallpox have been the results obtained by the preventive inoculation against diphtheria. Diphtheria antitoxin is administered to neutralize the toxin formed by the bacillus in the body of the patient. It has a restricted use for temporarily protecting susceptibles in close contact with the disease. This passive immunity is temporary and does not last over three weeks.

By means of the Schick test, it is possible to determine susceptibility to diphtheria. When the individual is immune a small amount of diphtheria toxin introduced into the skin produces no reaction and the skin appears normal after one week. When the individual is susceptible there remains one week after inoculation a definite red scaling area and often indurated. An immune mother transmits to her offspring sufficient antitoxin to protect it for a number of months, after which period practically all infants are suscep-

tible. As the number of deaths from diphtheria are greatest in the early years of life, it is very important that preventive diphtheria inoculation be carried out before the end of the first year of life. By giving three inoculations of diphtheria toxoid (which is a modified toxin), at intervals of two weeks, from 95 to 98 per cent of susceptible individuals are protected against diphtheria. The use of toxoid in place of toxin-antitoxin does away with the danger of sensitizing the child to horse serum.

Vaccination against smallpox and immunization against diphtheria are so well recognized as preventive procedures that it is as much the duty of a doctor to protect his patients against these two diseases as it is to treat a patient sick with pneumonia or nephritis.

More recently the cause of scarlet fever has been discovered and the toxin producing the rash and toxic symptoms demonstrated. The toxin is produced in the throat of the patient by the streptococcus scarlatinæ. By immunization of horses with this organism and its toxins an immune serum (antitoxin) has been produced which, if given in the early stages of scarlet fever, has a striking curative affect. By the use of this antitoxin the mortality in severe scarlet fever has been very definitely reduced. The incidence of scarlet fever in susceptible individuals is so low that antitoxin should not be used to prevent the disease, but used only in severe cases of the disease.

In determining susceptibility to scarlet fever, the soluble toxin, produced by the streptococcus scarlatinæ grown in plain broth, is used. A small amount is injected into the skin just as in the Schick test. A red indurated area after 24 hours usually indicates susceptibility to the disease and no reaction usually indicates immunity to the disease. The negative test in the newborn infant is not dependent on antitoxin transmitted from its mother as in diphtheria.

For temporarily immunizing the inmates of an institution or school to prevent the spread of scarlet fever active immunization has been successful.

Until a longer interval has elapsed and we can be sure of the permanence of the immunity, it does not seem advisable to recommend the use of active immunization against scarlet fever as a public health measure.

Up to the present time the cause of measles is

not definitely known; whether it be a streptococcus or filterable virus is still an open question. Degwitz has shown that if 5 c.c. of the blood serum of a patient who has recently recovered from measles is injected into a susceptible individual not more than four days after exposure to measles, the patient will be protected against measles for a period of about three weeks. If a boy is injected on the day that his sister comes down with the measles he is protected against the disease provided this is the only source of exposure. The same result can often be achieved with 10 to 15 c.c. of serum from any adult who has had measles. More recently the procedure has been changed in an attempt to modify rather than prevent measles. The resulting mild case of measles brings permanent immunity. Although it is not always possible to determine the exact time of exposure, the ideal time to give the serum is from six to seven days after exposure. It is of particular importance in preventing measles in the pre-school period. If the older brother or sister has come down with the disease, the right time to immunize the younger children is usually from one to two days after the measles rash breaks out in the older child.

The disease which, at present, is most difficult to control is whooping cough. Immunization against the disease and therapeutic infection with the Bordet Gengou bacillus has been extensively advised. The result must still be put in the not proven class. Some recent carefully controlled work does not indicate that either the prophylactic or the therapeutic injection is of any great value.

H. F. HELMHOLZ, M.D.

#### THE SALE OF SUNSHINE LAMPS TO THE PUBLIC

The Council on Physical Therapy has taken the stand that a sunshine lamp sold directly to the public should be so constructed that the radiant energy emitted shall not differ essentially from sunlight. Furthermore, the advertising and descriptive matter pertaining to such lamps should contain no curative claims nor mention of specific diseases. The Council believes that the advertising should be more conservative: it is not convinced that human beings in health require the great amount of ultraviolet energy one is lead to believe is the case from the advertising pertaining to some of the so-called sunlamps sold to the public. (Jour. A. M. A., June 14, 1930, p. 1918.)

## A PAGE FORUM OF THE COMMITTEE ON PUBLIC HEALTH EDUCATION

### Medical Statesmen

Is the doctor alive to his great need for aggressive, organized action? Is he ready to assume the leadership for which he alone is qualified to take the responsibility?

The 1930 meeting of the House of Delegates of the Minnesota State Medical Association indicates that the doctor in his organization is indubitably becoming statesman as well as healer and diplomat as well as researcher.

Veterans' legislation, public health, economic tendencies, as they affect the question of caring for the sick; the protection of the layman from the unscrupulous machinations of quacks, of defenseless students against fraudulent educational enterprises; the workings of the courts as they relate to the mental and physical health of offenders within their jurisdiction, health education by newspaper, radio and speakers—all these concerned the 56 members of the House of Delegates at the 1930 meeting as intimately and vitally, apparently as the traditional and special business of the profession.

Following are some of the interesting medico-humanitarian suggestions made by doctors for doctors on the floor of the House, and the men who made them.

Dr. C. B. Wright, Minneapolis: "While the economists are struggling with the difficult problem of the high cost of medical care, we can help to solve it materially, by helping our patients to cut down the loss of time due to sickness; by shortening hospital stays and promoting the convalescent home for the convalescent; by public health education which will assist our patients to avoid illness and to resist the lure of patent medicines which still, according to the best statistics available, consume more than twice as much of their income as doctors' fees."

Dr. O. E. Locken, Crookston: "We must be frank in our public health work. We shall not be obliged to force our conservative public health program down the throats of the laity if we inform them adequately first."

Dr. E. A. Meyerding, St. Paul: "A system for a government disability insurance policy by which the war veteran could choose his own doctor and his own hospital in case of illness would relieve the government of the vast burden of hospital building its present scheme for veterans' care involves. It would utilize the empty beds which are already the serious problem of every civilian hospital and thus lower the cost of hospital care to everybody and at the same time, preserve his self respect and right of choice to the soldier."

Dr. E. M. Hammes, St. Paul: "The committee on Medico-Legal Affairs strongly urges the creation of a psychiatric service which may be at the disposal of the courts for every juvenile case, no matter what its nature and to function before condition of every felon. It is necessary protection to the offender and to society as well. On the one hand, many of them are in need of medical care instead of punishment. On the other, lacking such a service, many mental cases are released at the expiration of their prison terms entirely free and as great a menace to society as before they were sentenced."

Dr. A. C. Schulze: "There are three classes of schools for laboratory technicians in Minnesota. The University courses offered at the hospitals are all of them adequate, thorough and reliable. The commercial schools, in several cases, offer only a six months course, with inadequate teaching facilities and instructors. One of these charges \$215 for a six months course, the other \$250. They carry on a remarkable program of advertising and promise excellent positions. On the strength of the promises and the short course these commercial schools have proven very attractive. There is practically no limit to what they can do and remain within the laws of Minnesota. Physicians should inform themselves thoroughly about these schools.

"Certainly no institution teaching medical technology can expect to have the endorsement of organized medicine that does not have at its head a director who has the title of M.D. or whose teachers are not registered technicians; that has not sufficient physical equipment to properly carry on this work and is not actually connected with a hospital for the purpose of securing clinical material; whose course is not at least 12 months long or that is openly commercial or carries on pernicious advertising."



## OF GENERAL INTEREST

Dr. H. L. Huffington, Mankato, has returned from a vacation trip to northern Wisconsin.

Dr. Roland E. Nutting, formerly with the Mayo Clinic, is now located in Duluth, Minnesota.

Dr. Anderson C. Hilding, formerly of Duluth, Minnesota, is now associated with the Mayo Clinic.

Dr. John F. Madden has announced the opening of offices at 842 Lowry Medical Arts Building, Saint Paul.

Dr. Joseph N. Gehlen, formerly associated with Dr. Hensel, recently opened an office at 642 Lowry Medical Arts Building.

Dr. M. I. Howard of the Mankato Clinic, Mankato, has resumed practice following a vacation spent in southern Minnesota.

Dr. C. A. McKinlay was called to Wichita, Kansas, July 17, because of the death of his father, Mr. L. McKinlay, of that city.

Dr. John J. O'Hara of Janesville has returned to his practice following an illness which confined him to the hospital for several weeks.

Dr. W. P. Crane left the Ancker Hospital July 1, after completing his internship, and will practice with his father, Dr. G. H. Crane, at Holstein, Iowa.

Dr. H. T. Petraborg of the University of Minnesota, class of 1929, has become associated with Dr. W. R. Humphrey in practice at Stillwater, Minnesota.

Edward Bratrud, F.A.C.S., of Warren, Minnesota, was elected to membership in the American Urological Society at a recent meeting held in New York City.

Dr. Edward C. Gibbs has become associated with Dr. Charles N. Hensel in the practice of internal medicine with offices at 1014 Lowry Medical Arts Building, Saint Paul.

Dr. P. D. Ward took up his duties as superintendent of the Miller Hospital, Saint Paul, July 1. Dr. Ward was formerly assistant director of the Albert Merritt Billings Hospital, Chicago.

Dr. Richard M. Johnson, formerly a graduate fellow in the Department of Medicine, University of Minnesota, is now affiliated with Dr. A. E. Olson and Dr. C. E. Alexander of Duluth, Minnesota.

Dr. George B. Weiser, New Ulm, was recently elected the new president of the Minnesota State Board of Medical Examiners. Dr. E. J. Engberg, Saint Paul, was elected secretary to take the place of the former secretary, Dr. E. T. Sanderson, Minnesota.

Information has just been received that Dr. Thomas P. Noble, formerly in orthopedic surgery in the Mayo

Foundation, has recently returned to Great Britain after three years of service in the Medical School of Chulalongkorn University at Bangkok, Siam, and has just been appointed by the King of Siam for three years as head of the surgical service of the Siamese government.

Dr. Richard Everingham Scammon, Professor of Anatomy at the University Medical School, has been appointed Professor of Anatomy at the University of Chicago. Dr. Scammon came here from the University of Kansas in 1911 as associate professor, and became full professor of anatomy in 1914. He has interested himself particularly in the anatomy of the growth of children and has published two books on the subject.

Quoting from the A. M. A. Journal of July 5, 1930: "Some eighteen names of physicians in the United States have been proposed for Affiliate Fellowship and approved by the Council of Scientific Assembly." The following seven are from Minnesota:

Dr. Herbert Davis, St. Paul; Dr. G. Deziel, Minneapolis; Dr. Geo. McIntyre, Minneapolis; Dr. Jennette McLaren, St. Paul; Dr. H. S. Nelson, Minneapolis; Dr. W. C. Portman, Jackson; Dr. W. H. Robilliard, Faribault.

Dr. Clarence M. Jackson, Director of the Institute of Anatomy at the University of Minnesota, and Dr. Richard E. Scammon, Professor of Anatomy at the University, have been honored by the selection of a symposium to which they contributed as the August "book of the month" by the Scientific Book Club. The book is *The Measurement of Man*, a study in biometrics which will be published by the University of Minnesota Press early in August. The late Dr. J. Arthur Harris, who was head of the Minnesota Botany department, and Dr. Donald G. Paterson, professor of Psychology, are the other authors contributing to the volume, which is the first Minnesota book to be selected as a "book of the month" by any book club. The essays in this symposium were originally lectures delivered at the university under the auspices of Sigma Xi.

It was formally resolved by the House of Delegates at the annual meeting of the State Association in Duluth to recommend Dr. Robert Emmett Farr, Minneapolis, for the next Nobel prize in medicine. Dr. Farr's work in the development of local anesthesia and anesthesia of the phrenic nerve has been individual, brilliant, and far reaching. It wholly merits, in the opinion of the house as expressed in the resolution, the most distinguished world recognition. In the absence of Dr. Farr, who is ill in Minneapolis, an important paper in which he outlined the principles involved in administration of local anesthesia was read by Dr. W. N. Graves, Duluth, as a feature of the symposium on anesthesia Wednesday morning. Two extraordinary moving pictures made by Dr. Farr himself, more than sixteen years ago when teaching, and demonstration by means of films, were shown by Dr. Stanley Maxeiner, Minneapolis, following the paper.

## CONSULTATION BUREAU

WM. A. O'BRIEN, M.D., *Director*

Minnesota State Medical Association

11 West Summit Avenue

Saint Paul, Minnesota

1. *Question*.—I would like to have your opinion on the etiological probabilities of a type of dermatitis which we have been encountering in bakery workers. The skin lesions present classically the pictures of the moist eczematous lesions of the usual chronic type, practically without exception occurring on the forearms but in some cases more widely distributed. I have made an effort to eliminate certain factors and, so far, have been unable to reduce our field to any single agent.

*Answer*.—The following information has been secured about baker's dermatitis. Three suggestions were offered:

1. That it is due to the excessive use of soap and water, keeping the hands and arms clean.
2. That it was related some way to the materials used in the bakery.
3. That it was coincidence.

In order to determine the cause, it will be necessary to try skin tests. Select some of the common flours used, and apply them under oiled silk to the arms. It will be necessary to leave it on for at least 48 hours before the negative can be determined. Another method is to scarify the skin and put some of the powder on it. This gives an immediate reaction and can be read in 15 to 20 minutes. It is also possible to buy from many of the supply houses the common antigens, (flour, wheat, etc.). Not long ago an article appeared, stating that many of the occasional dermatoses were due to soap and water. It would be advisable to also consider it from this angle.

2. *Question*.—I have a patient, male, 56, who is having some difficulty in starting the flow of urine, frequency and burning. There is no history of venereal diseases. Residual urine by catheter after emptying the bladder amounts to 2 ounces. Prostate enlarged, irregular and sensitive to touch. Every time I massage the gland even so gently that it doesn't cause any pain in the prostate, the patient complains of a sharp pain, like a "toothache" at the end of the penis. What is the explanation? There must be some nervous connection between these two regions.

*Answer*.—The enlargement is probably due to benign hypertrophy or prostatitis. The pain which is brought about by massage is apparently due to the inflammation or stone in the gland. Low ureteral pain is reflected to the end of the penis. Pressure on the prostate undoubtedly produces this reflex. The reason for the pain is the union of nerves from these two centers. What does the cystogram show and is there any evidence of ureteral stone in the lower portion?

3. *Question*.—Female patient, age 76, fairly well nourished, has lost 20 pounds the past two months and is lemon yellow color. Has been treated for double mitral and aortic lesion with decompensation for six months. Some edema of legs and some tingling. B.P. 120/0—apparently not decompensated now. Hemoglobin is 30 per cent. She has had recurrent attacks of vomiting, with temperature during the day or two it lasted. I feel a tender mass in the liver-gastric area which I regard as malignancy, as the outer portion of

the liver does not seem to be enlarged as we would expect with a passive congestion. No dyspnea. The patient looks like she has carcinoma of the stomach. Have not checked the stools yet, but no blood in the vomitus. Unable to get patient for X-ray. Red smears show marked hyperchromasia, anisocytosis and poikilocytosis.

*Answer*.—The smears are characteristic of pernicious anemia. It is possible that your patient also has carcinoma of the stomach. The blood change in both diseases may be identical. Both types of anemia may respond to liver treatment. I would advise that you start large doses of liver extract at once. We have seen remarkable responses as far as anemia is concerned in carcinoma of the stomach. When her heart condition improves, it would be advisable to move her and examine the stomach with the x-ray. Carcinoma of the stomach may be a local disease for a long time and if she has the condition, operation is indicated.

4. *Question*.—What is the best treatment for a pigmented nevus on the lower eyelid?

*Answer*.—A pigmented nevus of the lower eyelid may be treated with carbon dioxide snow, radium, or radium emanation (radon), actual cautery, or surgical excision. The chief objection to carbon dioxide snow is the inability to localize the treatment. The eyelid usually swells and is rather painful. Radium or radium emanation may be used by protecting the cornea with a lead shield, which fits behind the eyelid. It is usually coated with paraffin and the eyeball desensitized with novocain. The actual cautery or surgical excision may also be used. Radium, or radium emanation, seems to be the treatment of choice.

5. *Question*.—I have a patient with anemia. Has occasional sore tongue, not suggestive, however, nor is there convincing evidence of atrophy. Gastric symptoms are absent as well as neurological. Hemoglobin is 35 per cent. R.B.C.s count 1,480,000. No foci of infection can be found, although I insisted on an extraction of an old root. The dentist said it was not abscessed. Patient has a tooth in which pulp cavity has become devitalized. The blood shows anisocytosis, poikilocytosis, and polychromatophilia. There is an excess of the large cell forms.

*Answer*.—The smear is compatible with pernicious anemia. Have you done a gastric expression and determined the acidity? Check your neurological again. If no physical cause can be determined for the anemia, I believe that liver treatment, three or four vials of the extract daily, should be used without making a positive diagnosis of pernicious anemia.

6. *Question*.—I have a case of ulcerative colitis of about 6 weeks' duration. The stools are not sanguineous any more but the diarrhea persists and there is a gradual emaciation. What is the latest treatment for this type of a case? What is the status of Bergen's serum and where could it be obtained?

(Continued on following page)

## OBITUARY

### Arthur A. Law

1872-1930

Dr. Arthur A. Law was born at Harvard, Illinois, in 1872. After attending Shattuck Military Academy at Faribault, Minnesota, he took his medical training at the University of Minnesota Medical School, where he graduated in 1894.

During the Spanish-American war Dr. Law served as Lieutenant in the Medical Corps with the Thirteenth Minnesota Regiment and saw active service in the Philippine insurrection.

Early in his medical career he became identified with the Surgical Department at the University Medical School, and as Associate Professor of Surgery devoted much of his time to the University until his resignation a year ago on account of ill health.

With the rank of Lieutenant Colonel and as commanding officer of Base Hospital No. 26, the University of Minnesota Medical Unit, Dr. Law again gave valuable service to his country and at the close of the war was cited by General Pershing for exceptional meritorious and conspicuous service.

In 1922 Dr. Law became especially interested in thoracoplasty, in the surgical treatment of pulmonary tuberculosis and operated extensively at Glen Lake Sanatorium.

He was a member of the American, Western, International and Southern Surgical Societies, founder of the American College of Surgeons, a member of the Minnesota Academy of Medicine, besides being a member of Hennepin County, Minnesota State Medical Association and the American Medical Association. He was also a member of the Minneapolis, Minikahda and La Fayette Clubs, and of St. Mark's Church.

Dr. Law married Helen Elizabeth Lougee, by whom he is survived. His two daughters, Mrs. James G. Fullerton, Jr., and Mrs. John McD. Webb, of Minneapolis, and his mother, Mrs. Eva Ayer Law of Tacoma, also survive him.

Dr. Law's ingratiating manner and real love of humanity gained him a wide circle of friends and his name will long be identified with the leaders in surgical activities, not only in this state but throughout the country.

(Continued from page 588)

*Answer.*—It would be advisable to find the cause of your patient's diarrhea. Send a stool specimen to the Laboratories of the State Board of Health, on the campus. They furnish special containers for this purpose. The chances are that the patient is suffering with so-called nonspecific ulcerative colitis. Ileostomy is recommended before the patient emaciates too much. A bland diet, bed rest, transfusions for anemia, and subcutaneous fluid are used. There is a tendency toward remission. A few cases have lived for many years. Dr. J. A. Bargen, Mayo Clinic, would be very glad to inform you about the present status of his serum, and as to where it may be obtained.

## REPORTS AND ANNOUNCEMENTS OF SOCIETIES

### MEDICAL BROADCAST FOR THE MONTH

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 10:15 o'clock every Wednesday morning over Station WCCO, Minneapolis and St. Paul (810 kilocycles or 370.2 meters).

The speaker is William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month of August will be as follows:

August 6—Poison Ivy.

August 13—Knock Knees and Bow Legs.

August 20—Cause of Fever.

August 27—Cancer of the Stomach.

The annual meeting of the Southern Minnesota Medical Association will be held August 25, at Mankato, Minnesota. It will be a one-day session and an innovation is being tried this year in that the morning session is given over to clinical demonstrations and clinics.

On account of the type of demonstration on spinal anesthesia, it is necessary to have this demonstration at St. Joseph's Hospital at 8 o'clock.

The Teachers' College building with five class rooms equipped with blackboards, lantern slide projectors, and machines has been made available. This lends itself exceedingly well to clinical demonstrations and clinics.

Lunch will be served at the Teachers' College building, and the banquet will be held at the Mankato Country Club.

A feature of the morning session is the presentation of interesting case reports by various men throughout southern Minnesota. An hour and a half will be given over to that. It is hoped that as many men as possible will bring reports of interesting cases they have seen for discussion.

### PROGRAM

#### MORNING SESSION

8:00 o'clock—St. Joseph's Hospital

Clinical demonstration of spinal anesthesia.

W. C. STILLWELL, M.D., Mankato.

Discussion: C. F. McCUSKEY, M.D., Rochester.

9:00 o'clock—Teachers' College Building

Clinical sections and demonstrations will be held in the class rooms.

9:00 A. M. Clinical demonstration of varicose vein injection and treatment.

C. F. DIXON, M.D., Rochester

9:00 A. M. Clinical-pathologic demonstration.

W. A. O'BRIEN, M.D., Minneapolis.

9:00 A. M. Hematology demonstration.

F. J. HECK, M.D., Rochester.

10:30 A. M. Pediatric clinic.

R. N. ANDREWS, M.D., Mankato.

- 10:30 A. M. X-ray demonstration.  
L. G. RIGLER, M.D., Minneapolis,  
J. D. CAMP, M.D., Rochester.
- 10:30 A. M. Uroselectan: Indications and uses.  
E. P. CATHCART, M.D., Rochester.
- 11:30 A. M. Unusual case reports. Discussion led by:  
W. A. O'BRIEN, M.D., Minneapolis.
1. Hemachromatosis.  
J. J. HEIMARK, M.D., Fairmont.
  2. Fat embolism.  
A. L. VADHEIM, M.D., Taylor.
  3. Congenital pyloric stenosis.  
B. J. GALLAGHER, M.D., Waseca.
  4. Malignant tumor: Meckel's diverticulum.  
L. S. FAUST, M.D., Rochester.
  5. Vicarious menstruation.  
W. C. BERNSTEIN, M.D., New Richland.  
(Others to be announced later.)
- 12:30 o'clock. Luncheon and business meeting at Teachers' College Building.

#### AFTERNOON SESSION

- 1:30 o'clock—Auditorium of Teachers' College Building  
The Art of Medicine.  
W. C. ALVAREZ, M.D., Rochester.
- Coronary disease with special reference to acute coronary accidents, their recognition and treatment.  
H. W. RATHE, M.D., Waverly, Iowa.
- Acute surgical conditions of the abdomen, their diagnosis and treatment.  
Author to be announced later.
- Hypertension: Case report of unusual vascular disease.  
CHARLES KOENIGSBERGER, M.D., Mankato.
- Backache from the orthopedic viewpoint.  
R. K. GHORMLEY, M.D., Rochester.
- The prostate gland in a general examination.  
A. E. J. SOHMER, M.D., Mankato.
- Treatment of Bright's disease.  
MOSES BARRON, M.D., Minneapolis.
- Non-mixedematous hypothyroidism.  
C. H. HENSEL, M.D., St. Paul.
- Epileptic seizures, their relationship to brain tumor.  
H. L. PARKER, M.D., Rochester.
- The importance of toxic goiter complicating or complicated by other conditions requiring surgical interference.  
C. W. MAYO, M.D., Rochester.
- Appendicitis. A study of 100 consecutive cases.  
SIGRUD GUNDERSON, M.D., LaCrosse, Wis.

#### BANQUET

- 6:30 o'clock—Mankato Country Club  
Toastmaster—WALTMAN WALTERS, M.D., President.
- Addresses by:
- W. J. MAYO, M.D.  
S. H. BOYER, M.D., President of the Minnesota State Medical Association.  
E. S. JUDD, M.D., President-elect of the American Medical Association.  
W. A. ROHLF, M.D., President of the Iowa State Medical Association.

#### ANNUAL MEETING AT DULUTH

The annual meeting of the State Association held at Duluth was particularly well attended, there being 641 registrants as compared with 500 at the meeting three years ago at Duluth. The participation by guests from other parts of the country and from abroad afforded added interest to the program.

The scientific program was diversified but in the main interesting. The poor acoustics of the ballroom of the Hotel Duluth detracted considerably from the enjoyment of the program. Few physicians know how to speak well, and on the other hand, few are at ease with the microphone of a loud speaker. They can learn, however. It was also unfortunate that the county delegates had to miss so much of the scientific program, through attendance at the two meetings of the House of Delegates. This conflict should and doubtless will be avoided in the future. A dozen or more members had the unfortunate experience of having their pocket-books stolen from their rooms in the Hotel Duluth while they peacefully slept. Travelers' checks are not much bother and will doubtless be more popular with certain members attending state meetings in the future.

Advantage was taken of the opportunity to obtain an expression of opinion regarding the value of Dr. Hanson's thymic extract in the treatment of cancer. Some twenty-five Minnesota physicians met and each gave his experience. No cures were reported. For the most part advanced cases of carcinoma in which surgery, x-ray or radium had failed constituted the majority of those reported. In a few instances the physicians thought there was a definite reduction in the size of metastatic tumor growths. Some reported the definite relief of pain. Dr. Hanson referred to experiments now being conducted to test the true value of his extract.

Our meetings in Duluth are always popular. Not too far to reach by motor, the scenic grandeur of Minnesota's port never fails repeatedly to thrill the visitor. And there is always evident a feeling of real cordiality on the part of the Duluth members of the Association.

The minutes of the meeting will eventually appear in the journal. Suffice it to say that our next meeting will be in Minneapolis and the following officers were duly elected:

- President—Dr. L. Sogge, Windom.  
First Vice President—Dr. W. H. Condit, Minneapolis.  
Second Vice President—Dr. O. W. Parker, Ely.  
Secretary—Dr. E. A. Meyerding, Saint Paul.  
Treasurer—Dr. A. G. Schulze, Saint Paul.  
Councilor Second District—Dr. W. A. Piper, Mountain Lake.  
Councilor Fourth District—Dr. J. S. Holbrook, Mankato.  
Councilor Sixth District—Dr. N. O. Pearce, Minneapolis.  
Councilor Eighth District—Dr. O. J. Hagen, Moorhead.  
A. M. A. Delegates—Dr. H. M. Johnson, Dawson; alternate, Dr. B. S. Adams Hibbing. Dr. W. F.



Braasch, Rochester; alternate, Dr. W. L. Burnap, Fergus Falls.

### WABASHA COUNTY MEDICAL SOCIETY

The sixty-second annual meeting of the Wabasha County Medical Society was held at Wabasha Thursday, July 10, Doctor Russell H. Frost presiding.

There were twenty-four in attendance, including members, guests and accompanying doctors' wives.

At the business session in the forenoon, various matters were discussed, committee reports received, and one new member was elected, Dr. Clifford N. Rudie of Mazeppa. Officers were elected for the coming year as follows: President, Dr. E. C. Bayley, Lake City; vice president, Dr. W. B. Stryker, Plainview; secretary-treasurer, Dr. W. F. Wilson, Lake City. Delegate to state association, Dr. W. H. Replogle, Wabasha; alternate, Dr. D. P. Dempsey, Kellogg. Censor for three years, Dr. J. A. Slocumb, Plainview, to serve with Drs. Cochrane of Lake City and Bond of Wabasha. It was voted to hold the next annual meeting at Lake City.

Dinner and other entertainment was afforded through the courtesy of the members residing at Wabasha and Kellogg.

In the afternoon, the following program was presented:

President's Address—"Some Newer Aspects of the Tuberculosis Problem," Dr. Russell H. Frost, Superintendent Buena Vista Sanatorium, Wabasha.

"Undulant Fever with Report of a Case," Dr. E. Covell Bayley, Lake City.

"Recent Developments of Surgery," Dr. Waltman Walters, Mayo Clinic, Rochester.

"Surgical Problems of the Gall-Tract," Dr. Joseph S. Collins, Wabasha.

"Relation of the Medical Profession to the Public," Mr. F. Manley Brist, Attorney for the State Board of Medical Examiners, Saint Paul.

Other speakers were Dr. M. S. Henderson of Rochester, Councilor for this district, and Prof. Felix von Mikulicz of the Frauenklinik, University of Berlin, who came as a guest with the surgeons from the Mayo Clinic. It was esteemed quite a privilege to hear this distinguished German professor talk on the methods of treating cancer at his clinic.

All the papers were well received and elicited general discussion.

A rising vote of thanks was tendered to the outside speakers and all those who had part in the entertainment of the society.

W. F. WILSON, M.D., Secretary.

### SCOTT-CARVER COUNTY MEDICAL SOCIETY

A meeting of the Scott-Carver County Medical Society was held at Watertown, Minnesota, July 8, 1930.

Dr. C. D. Harrington of Minneapolis addressed the society on the "X-ray Diagnosis of Gastrointestinal and Gallbladder Lesions."

Dr. A. E. Benjamin discussed the "Lesions of the Gastrointestinal Tract and Gallbladder and Their Sur-

gical Treatment." Upon invitation from Dr. F. H. Buck it was decided to hold the next meeting at Dr. Buck's cottage at Prior Lake in August.

B. H. SIMONS, Secretary.

## MISCELLANEOUS

### MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

#### UNLICENSED PRACTITIONER OF MEDICINE FINED \$500 State vs. Ziegler

The defendant, Fred Ziegler, of Elmore, Minnesota, was arrested June 18, 1930, for practicing medicine without a license at Springfield, Minnesota. The defendant, a man sixty-one years of age, has been engaged in bleeding and cupping for the past twenty-six years in Faribault County. He has no medical education except a correspondence course in Chiropractic. He claims to have a "Degree of Doctor of Naturopathy." On Friday, July 11, Ziegler entered a plea of guilty before the Hon. A. B. Gislason, Judge of the District Court at New Ulm, Minnesota, and was fined \$500. Ziegler paid the fine. The defendant was warned that he would have to refrain from practicing in the future or he would be dealt with more severely. The imposing of substantial fines as was imposed by Judge Gislason in this case will go a long way in eradicating quacks, fakers and unlicensed practitioners. The Court in no uncertain terms informed the defendant that such practices would not be tolerated in this State. Judge Gislason is to be commended not only by the medical profession, but by the public, for his firm stand on these matters. The matter was handled by Mr. Brist on behalf of the State Board of Medical Examiners and splendid coöperation was received from T. O. Streisuth, County Attorney, and Sheriff J. J. Reitter of Brown County.

### DIGESTIVE ENZYMES FOR ORAL ADMINISTRATION OMITTED FROM N. N. R.

The Council on Pharmacy and Chemistry reports that in consideration of the replies to a questionnaire sent out in 1925 it was decided at that time to continue the acceptance of gastric ferment preparations, including those intended for internal administration, to await confirmatory evidence in favor of their use. No acceptable evidence showing the value of gastric enzymes when administered orally having become available, the Council has omitted all digestive enzyme preparations save those recommended for use outside the body for the digestion of food previous to administration and locally for the softening of dead tissues or the solution of false membranes. The following are the products which have been omitted: Elixir of Enzymes (Armour & Co.); Essence of Pepsine-Fairchild, Gastron, Holadin and Diazyme Glycerole (Fairchild Bros. & Foster); and Panase (Frederick Stearns & Co.) (Jour. A. M. A., June 14, 1930, p. 1919.)

## PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

## MEDICINE

### SUPERVISORS:

F. J. HIRSCHBOECK  
205 W. 2nd STREET, DULUTH

THOMAS A. PEPPARD  
MEDICAL ARTS BLDG., MINNEAPOLIS

OBSERVATIONS ON THE ETIOLOGICAL CORRESPONDENCE BETWEEN ANGINAL PAIN AND CARDIAC INFARCTION: Carey F. Coombs, From the University Centre of Cardiac Research, Bristol (Quarterly Jour. of Med., April, 1930, p. 233). The histories given by a series of patients presenting themselves because of precordial pain were scrutinized. These were divided into two groups, the first group of 86 cases consisting of cases in which cardiac pain, persistent in character, not necessarily excited by effort, was followed by evidence of gross injury to the wall of the heart; the second group, consisting of 201 cases, in which pain was excited by effort, relieved by its cessation, and not followed by structural sequelæ. The age and sex incidence of the two groups corresponded closely with one another.

The angina of effort occurs principally in association with cardiac syphilis, high arterial tension, and senile degeneration of the heart. Cardiac infarction occurred in the second and third of these groups; namely, hypertension and senile degeneration, but occurred rarely in cardiac syphilis. Both syndromes, i.e., the angina of effort and cardiac infarction, are rare in the other infective and toxic diseases of the heart. The occurrence of cardiac pain in pernicious anemia is referred to. In the author's own series of 36 cases, substernal pain of the cardiac type was mentioned eight times, a much higher incidence than Willis and Giffin encountered in their cases.

There are three structures concerned in the supply of arterial blood to the wall of the heart: the first part of the aorta, the aortic semilunar valves, and the coronary arteries. For proper function the aorta must be elastic, the semilunar valves competent, and the coronary arteries pervious and distensible. Competency of the aortic valves is the least essential requisite of this apparatus for supplying blood to the cardiac wall. The author inclines to believe there is no real rivalry between the aortic and coronary hypothesis of angina.

In some cases, it is the fault of one, in others the fault of the other part, and again both parts may be so damaged as to be inefficient. The author believes coronary arteries to be the principal offenders in provoking angina. Rigidity of the coronary arteries as well as stenosis has an important bearing on the efficiency of the artery. Cardiac infarction is rare in cardiac syphilis, because it does not alter the arterial linings in such a way as to prepare them for the formation of thrombi, these vessels being attacked by this condition only at their orifices.

It is concluded that pain of an anginal kind is produced by all the diseases which fail to forward oxygenated blood to the cardiac muscle.

T. A. PEPPARD, M.D.

## PEDIATRICS

### SUPERVISORS:

CHESTER A. STEWART  
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ROY N. ANDREWS  
MANKATO CLINIC, MANKATO

PHENYLETHYLHYDANTOIN IN THE TREATMENT OF SYDENHAM'S CHOREA: Hartzell H. Ray, M.D., and John S. Cunningham, M.D., Rochester, N. Y. (Amer. Jour. of Dis. of Children, Vol. 39, No. 6, June, 1930). Phenylethylhydantoin was introduced under the name "nirvanol" in 1916 as a sedative. The frequent occurrence of severe symptoms such as rash or fever led many authors to warn against its use. In 1919, Roeder recommended phenylethylhydantoin in the treatment for chorea minor.

The dose for younger children was 0.3 Gm. (5 grains) per day; for the older children, 0.6 Gm. (10 grains); the drug was given for from seven to nine days.

Observations suggest the following conclusions: Treatment with phenylethylhydantoin greatly shortens the course of Sydenham's chorea. This effect is more obvious in the more severe cases. The recurrence of chorea is no more frequent after the administration of phenylethylhydantoin than after other forms of treatment. The beneficial results did not always seem to depend on the development of fever or rash. On the basis of this small series of cases, no claim can be made that all patients with chorea will respond to the treatment. The relatively poor response in mild cases strongly suggests that many will not.

Phenylethylhydantoin proved more effective than other drugs in the treatment of chorea. In the present comparative study, the mean duration of chorea from the beginning of treatment was thirty-one days when phenylethylhydantoin was used, and one hundred and fifteen days when other drugs were used.

Mild chorea is not so rapidly cured as is the severe

form. Although "nirvanol sickness" may cause considerable temporary discomfort, we have observed no permanent harmful effects from the drug.

On account of the possible danger of injury to the bone-marrow, it is desirable that frequent blood counts be made in cases in which patients with chorea are treated by phenylethylhydantoin. The administration of the drug should not be continued over periods longer than ten days, or after the appearance of the eruption.

R. N. ANDREWS, M.D.

**ASTHMA IN CHILDREN:** M. Murray Peshkin, M.D., New York (*Amer. Jour. of Dis. of Child.*, April, 1930, Vol. XXXIX, No. 4). With the introduction of protein skin tests in the past decade, the entire subject of asthma from the standpoint of etiology and treatment has undergone radical revision.

It has become evident that to fix the causative factor in asthma there is required not only a complete series of protein skin tests accurately performed and properly interpreted, but a carefully taken history, a physical examination, including roentgenoscopy of the chest, tuberculin skin and various laboratory tests, and a careful study of the patient over a considerable period.

A practical method of classification of asthma along etiologic lines is now possible. In this new classification there are three main groups, which include all types of asthma: (1) protein sensitive asthma; (2) protein non-sensitive asthma, and (3) para-asthma (these cases are directly caused by an enlarged thymus or enlarged bronchial lymph nodes or both, and also by any pathologic condition inducing tracheobronchial stenosis).

It must be conceded that at least between 10 and 60 per cent of the patients who have received modern treatment continue to have asthma.

Twenty-five children (twenty-two children sensitive and three non-sensitive to protein) were treated by a change of environment. In spite of the fact that the inhalant and the dietetic restrictions were kept less rigid than at home, twenty-three children, or 92 per cent, were markedly improved or entirely relieved of asthma. Seventeen of these twenty-five children have been returned to their homes for periods varying from 6 months to 5 years or an average of 2 years per patient. Thirteen of these seventeen children, or 76 per cent, are not greatly improved or relieved from asthma. In some of these children, appropriate treatment after change of environment was successful, whereas it has failed before.

Until newer methods of treatment are advanced which will successfully control or free this group of children from asthma, the establishment of a "home" where a child with chronic refractory asthma can be kept for at least six months, is regarded as a humane, urgent and economic necessity, as well as a therapeutic measure of definite value.

R. N. ANDREWS, M.D.

## EYE, EAR, NOSE AND THROAT

### SUPERVISORS:

**VIRGIL J. SCHWARTZ**

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**ARTHUR C. DEAN**

HOT SPRINGS, SOUTH DAKOTA

**ATROPHIC AND VASOMOTOR RHINITIS**  
Simon L. Ruskin, New York (*Arch. of Otolaryng.*, Vol. II, No. 6, June, 1930, p. 689). In a series of cases in which I gave injections into the sphenopalatine ganglion for relief from the painful syndrome of neuralgia of the nasal ganglion, following the injection I observed nasal congestion that lasted for a period of time varying from a few days to two or three months.

It also occurred to me that in the more advanced state of so-called atrophic rhinitis there may be a profound and continued influence on the vasoconstrictor nerves, inducing a state similar to that of Raynaud's disease in the extremities. I selected a typical case of atrophic rhinitis. I made injections into both nasal ganglions by the posterior palatine route. Following the injection there was a gradual diminution of nasal secretion with a lessening in the amount of crusting. Subsequently, the tissues began to take on a pinkish color and to assume a fuller appearance. After three weeks, it was apparent that the left side was improving more rapidly than the right. I therefore again gave injections into the right nasal ganglion. Within a few days after the injection the right side showed distinct improvement. At present, there is hardly any crusting on the left and only a small amount of crusting on the right. The foul odor has practically disappeared. The patient formerly suffered from an associated dry pharyngitis. At present she is practically free from any complaint referable to the pharynx.

I am led to suggest that atrophic rhinitis, so-called ozena, when not due to sinusitis is a disease caused by the abnormal sensitiveness of the vasoconstrictor nerves resulting in a continuous or intermittent spasm of the smaller arteries and arterioles.

Just as interesting as the influence of freeing the atrophic nasal membrane from the vasoconstrictor action is that induced by section of the vasodilators in so-called vasomotor rhinitis. In the tonic or intermittent overaction of the vasodilators there is a boggy, bluish, pale membrane filling the nasal fossæ and seeped in thin serous discharge. This appearance is common in allergic conditions and is variously diagnosed. When it is associated with specific sensitivity as demonstrated by skin tests, it is classed as hayfever or protein sensitivity. When it is not associated with a specific skin reaction, it is frequently called vasomotor rhinitis. The observations on both nasal mem-

branes are the same, and the interesting thing is that both react alike to blocking of the vasodilators. In both instances the nose becomes dry and the nasal passages clear.

In the allergic states both nasal ganglions must be blocked simultaneously. Following the injection of alcohol-phenol, the cheeks become somewhat puffy for a few days as after the extraction of a tooth. The dryness of the nose becomes apparent in about twelve hours, at times within one or two hours.

#### CONCLUSIONS

Atrophic rhinitis when not due to sinusitis is a disease caused by the abnormal sensitiveness of the vasoconstrictor nerves which results in a continuous or intermittent spasm of the smaller arteries and arterioles.

Vasomotor rhinitis is a disease similarly caused by the abnormal sensitiveness of the vasodilator nerves which results in a continuous or intermittent relaxation of the smaller arteries and arterioles.

Both the vasodilators and the vasoconstrictors of the nasal mucous membrane can be cut or blocked at the nasal ganglion.

ARTHUR C. DEAN, M.D., F.A.C.S.

**SUB-MAXILLARY FOSSA APPROACH TO DEEP PUS IN THE NECK:** Harris P. Mosher (Trans. of the Amer. Acad. of Ophthalmology and Otolaryngology, 1929. Page 19). The pharyngo-maxillary fossa most frequently becomes infected by extension from the following structures: first, the tonsils; second, the glands just anterior to the second cervical vertebra and its fascia, which drain the nose and pharynx and are the glands that suppurate in the retro-pharyngeal abscess of infants; third, the parotid or the tip of the mastoid. Pus thus formed may kill the patient by rupturing into the larynx or trachea, or more slowly by causing a thrombosis of the internal jugular vein with subsequent septicemia.

The cervical fasciae are prolongations of the carotid sheath. This makes the carotid sheath a core of all the soft structures of the neck. By following it pus may reach the base of the skull above or the chest below, so it must be followed in order to locate hidden abscesses as this is the natural highway for pus.

There are three fossae in this region—two actual, the sub-maxillary and the parotid, and one potential, the pharyngo-maxillary. The last may be regarded as a cone, with the base attached to the skull around the jugular foramen and the apex at the hyoid bone. The carotid sheath emerges from the apex of the cone and for all practical purposes, continues the fossa into the thorax.

The inner boundary of the fossa is the superior constrictor muscle with the tonsil attached. The outer

boundary below, is the internal pterygoid muscle lining the inner surface of the ascending ramus of the lower jaw; above it is the parotid gland, which at this point is not covered. Posteriorly are the prevertebral muscles and fascia. The fossa is divided into unequal parts by the styloid process and the muscles arising from it. These are in front of the great vessels and protect them.

In tying the external carotid artery, a large T-shaped incision is made beginning just below the angle of the jaw and following the edge of the sterno-cleido-mastoid down for about 2 inches. If the neck is thick and deep a rectangular flap is turned down. The object is then to find the tip of the great horn of the hyoid. The external carotid will then be found lying just outside the tip.

The sub-maxillary fossa approach commands the side and base of the tongue, the floor of the mouth, and the neck from the base of the skull to the clavicle. A generous T-shaped incision is made and the sub-maxillary gland is exposed and turned up. The facial vein runs across the middle of the field so it must be tied and cut. The carotid sheath lies opposite the tip of the great horn of the hyoid. The sheath is then followed upward and downward. Upward the finger enters the pharyngo-maxillary fossa and passes to the outside of the tonsil. Continuing upward the styloid process is felt and lateral to this, the base of the skull.

In dealing with pus at the base of the tongue or in the floor of the mouth, an incision is made at the base of the sub-maxillary fossa. This can be carried forward or backward as indicated.

L. G. FLANAGAN.

**BRONCHIECTASIS, AN UNAPPRECIATED CAUSE OF CHRONIC BRONCHITIS:** Alton Ochsner (Jour. A. M. A., Vol. 93, p. 188, July 20, 1929). This is an article about bronchiectasis and gives a new way to introduce iodized oil into the lungs. The author calls it the "passive technic."

1. Use antiseptic mouth wash.
2. Paint anterior surface anterior tonsil pillars with 10 per cent cocain solution until swallowing reflex is lost.
3. Three c.c. 3 per cent procain hydrochloride solution is taken into mouth. Tip head backward, protrude the tongue, lean slightly to side that it is desired to fill, breathe.
4. Paint the anterior pillars again as in procedure 2.
5. Place patient behind fluoroscopic screen—swallow 10 c.c. iodized oil—assume position and tactics as in procedure 3. Watch oil flow into lung.
6. Expectorate saliva and inhale a second 10 c.c. of the oil.

A. C. DEAN, M.D., F.A.C.S.



## ROENTGENOLOGY

## SUPERVISORS:

LEO G. RIGLER,

UNIVERSITY HOSPITAL, MINNEAPOLIS

A. U. DESJARDINS,

MAYO CLINIC, ROCHESTER

**STUDY OF ROENTGEN THERAPY IN MENTAL AND NERVOUS DISEASES OF CHILDHOOD:** W. von Wieser (*Strahlentherapie*, Bd. 31, 1928, 147-163). This study of the effect of roentgen therapy in mental and nervous diseases of childhood was begun in 1923 as a result of the observation that the irritability of children can be improved by radiation of the brain. It was then observed that other symptoms besides irritability were influenced by radiation. The symptoms which can be influenced are classified at length under

- (A) Mental disturbances, which include disturbances of the senses, memory, coördination, attentiveness, vanity, feelings, moods, affections, disturbances of the primitive motions and actions, temperament, character, and
- (B) Bodily disturbances, including the various abnormalities of development, deficiencies of speech, stuttering, gross motor defects, as muscular weakness and lameness, convulsive attacks, endocrine disturbances, etc.

While at first the attempt was only to treat the symptoms, cases were later treated systematically according to the diagnosis, as the favorable effect on many symptoms was gradually made manifest.

The indications based on Ziehen's classification include:

- (A) Psychoses with defects of intelligence under which are included:
  - I. Congenital psychoses, as mongolism (see below, abstract of special article dealing with this condition), dysgenital imbecility and microcephalic imbecility.
  - II. Acquired psychoses (dementia), including various forms of dementia epileptica, and dementia on the basis of encephalitis, meningitis, etc.
- (B) Psychoses without defects of intelligence, including various forms of noetic psychoses, periodic psychoses and psychotic constitutions.
- (C) Bodily disturbances with normal mentality, under which are included disturbances of growth, as chondrodystrophy and dwarfism.

It is pointed out that mental improvements are usually secondary to bodily improvements and that this is one explanation of the mental effects obtained as a result of radiation, which first brings about an improvement in growth and in the physical condition. The effects on other symptoms are due to the well known beneficial effects of radiation on inflammations and

scars, which are the underlying pathology in some of these conditions.

Radiation was directed primarily to both temporal regions. Because of the associated endocrine disturbances in most of these cases, the thyroid, thymus and genitals were soon also treated and later also the cervical, thoracic and lumbar spinal cord, adrenals and tonsils, because symptoms due to abnormalities of these parts were often present.

Tuberculosis is often a complication. Radiation is then usually not indicated until the tuberculosis has improved, when it may be unnecessary because of the coincident improvement in the neurological and mental condition. Treatment is not indicated in high grade hydrocephalus when active inflammation is present, in cases of marked microcephaly when the sutures are completely closed, and in all cases with marked elongation of the dorsum sellæ.

Experience has led to a marked reduction in the doses at first given and in certain cases to an increase in the intervals. The head is now radiated through five different areas, one area at a time. According to the nature of the cases, treatment of combinations of regions is indicated, as brain, spinal cord, and the glands of internal secretion.

The most difficult and important problem is the determination of the correct dose. Complete clinical examination, taking into account all associated conditions, is a necessary preliminary. Basal metabolism, capillary microscopy and especially the ferment reaction of Abderhalden, are of great value in dosage estimation. The most important thing to realize is that doses of 1 to 2%, measured at the lesion, given once a week, which for other purposes are considered small doses, may under certain conditions be 5 or 10 times as large as should be given.

EDWARD SCHONS, M.D.

**FURTHER EXPERIENCES WITH ROENTGEN THERAPY IN PSYCHIATRIC AND NEUROLOGICAL DISEASES.** I. Mongolism: W. von Wieser (*Strahlentherapie*, Bd. 32, 1929, 215-292). The writer has made a considerable study of the effects of roentgen treatment in various forms of weak-mindedness in children. This paper is his first publication on a specific disease, having chosen mongolism as his first subject for 6 reasons: (1) It is the easiest to treat; (2) with the exception of myxedema and cretinism, it is the best known; (3) it is the most exactly defined; (4) its course without treatment is at least known to some extent; (5) likewise its course under medical treatment; (6) the cases are so similar that comparison between treated and untreated cases is possible.

The first part of the paper deals with a description of the disease and its principal symptoms, pathological and anatomic findings, prognosis and results with usual treatment. The paper is based on his experiences in the examination and treatment of forty-six cases, varying from 6 months to 18½ years of age. Twenty-eight of the cases received deep x-ray therapy. Of the untreated cases it was possible to follow 6 cases

as controls. The time of observation of the treated cases ranged from 8 months to 3½ years, the average period of observation of the treated cases being 17 months, of the untreated 26 months.

The first physical characteristic proven to be influenced by roentgen treatment is the growth in height and weight. The effect of x-ray treatment on the rate of growth is discussed very elaborately and compared with the untreated control cases by numerous charts and curves. The studies show that the effect of x-ray treatment on the rate of growth in mongolism is almost as marked as the effect of thyroid treatment in cretinism and myxedema. Comparison of treatment of mongolism by organotherapy is not possible, as there are no cases reported in the literature. It is emphasized particularly that the maximum or most favorable effect on the growth is directly dependent on the correct dosage, either too small or too large a dose being detrimental.

The effects on the many features of these cases are discussed in detail and compared with the control cases, the treated cases showing a marked advantage in the improvement of all symptoms over those which were not treated. Less reliance is placed upon comparison of the psychic symptoms before and after treatment with those of the control cases than on the physical characteristics, comparison here being more difficult. A definite improvement in mentality, speech, and progress in school work is, however, shown. Practically all of the symptoms showed the greatest improvement at the ages from 4 to 7. This is attributed

entirely to the dosage having been approximately correct for this age period.

The present treatment consists of irradiation of the head, using five areas, 6 × 8 cm., in size, at a 30 cm. target-skin distance, voltage 180 to 200 K. V. P., ½ mm. zinc plus 1 mm. aluminum, 5 to 10 per cent of the erythema dose per area, one to 2 areas a week at intervals of three to four days; in younger children often only one area in two weeks, in extreme cases only one area in four weeks. Usually the five areas were treated successively twice, followed by intervals of at first four and later six, eight or ten weeks. In the early cases the doses were greater, often two areas receiving each 25 to 30 per cent. Both areas were again treated in four weeks, with intervals of from six to eight weeks and over after the third series. The areas were so arranged that the lower half of the middle fossa of the skull and the nasal sinuses were treated. In children under three radiation of the entire body with 2 per cent of an erythema dose at 2 meters, given at intervals of four weeks, were frequently sufficient. Radiation of the thyroid, thymus and genitals with small doses was done at first but has now been given up, as the same results can be obtained more certainly with radiation of the skull. The dose is gauged according to the severity of the case and the age of the patient. Organotherapy was combined in the earlier cases but has been dropped, as its effects were found to be subordinate to those from radiation and such treatment was ineffective in taking the place of radiation.

EDWARD SCHONS, M.D.

#### CANCER DEATH RATES IN VARIOUS CITIES

A comparison of the cancer death rates in various cities throughout the United States indicates that the increasing incidence of the disease is not limited to any one section of the country. The accompanying chart shows the death rates from cancer in Boston, New York, Philadelphia, Chicago, St. Louis, and San Francisco, as computed by the United States Census Bureau. Each of these cities, it will be seen, had a higher rate in 1927 than in 1920. In New York, for instance, the cancer death rate per 100,000 of estimated population was 104.1 in 1920, and 139.0 in 1927, an increase of 35 points. In Boston, although the increase was not so great, the rate for 1927 was the highest among the six cities; that is, in 1920, the cancer death rate there was 116.9 per 100,000, and in 1927 it was 139.5. On the Pacific coast, San Francisco had a cancer death rate of 130.9 per 100,000 in 1920, and of 135.4 in 1927, while St. Louis, in the Middle West, had a rate of only 99.7 in 1920 and of 119.7 in 1927. In Chicago, the cancer death rate in 1920 was 103.6 and

in 1927 it was 120.4. In Philadelphia, which has the lowest rates of the six cities, the increase was from 93.5 in 1920 to 112.0 in 1927. It must be remembered, however, in making a comparison of these different rates, that the recorded prevalence of cancer depends largely on the ability of the physician in diagnosing the disease and on the accuracy of death certificates. Increased efficiency and accuracy are probably responsible for some part at least of the rise in the recorded death rates. It must also be remembered that the death rates in the cities are higher than those in the rural districts because many patients are attracted from the country to the hospitals in the cities, and their deaths are often included in the city records. The importance of variations in correctness of diagnosis is shown by the fact that routine autopsies of patients in institutions for the aged or in large city hospitals reveal about 30 per cent. of undiagnosed cases of cancer.

These statistics, based on adjusted rates, have been compiled from the reports of the United States Census Bureau, by the American Society for the Control of Cancer.—*Health News*, July 7, 1930.

## BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

## BOOKS RECEIVED FOR REVIEW

REPORT ON FIFTH INTERNATIONAL CONGRESS OF MILITARY MEDICINE AND PHARMACY, London, England, May, 1929. By Commander William Seaman Bainbridge, M.C.-F., United States Naval Reserve. 154 pages. Illus. Menasha, Wis., The Collegiate Press, 1930.

SURGICAL AND MEDICAL GYNECOLOGICAL TECHNIC. Thomas H. Cherry, M.D., F.A.C.S., Professor of Gynecology, New York Post-Graduate School and Hospital. Cloth. Price, \$8.00. 678 pages, with 558 illustrations. Philadelphia: F. A. Davis Company, 1929.

The purpose of the author is best presented in his own words: "I have attempted to present in this work, which in all teaching is of great value, a single method of therapy, based upon anatomy and pathology and to give sufficient illustrations to make this logical and comprehensive; in the surgical descriptions to present a sufficient number of illustrated steps, that a gap in sequence would not exist, so that one could readily follow the operation to its completion."

The book is neither a text nor an encyclopedia. The method of treatment described for each condition is that one which the author has used with results satisfactory to himself. The reader is thus spared elaborate discussions of a variety of methods. The absence of physiology, symptomatology and of diagnosis emphasizes the single purpose of the volume.

The text is concise, but is supplemented so aptly by the author's own pen and ink engravings that the reader will be able to follow the steps of operative procedures with less difficulty than usual. These drawings are a feature of the book which the author refers to rather apologetically, but which the reader will find uniformly and singularly clarifying.

The book is divided into two sections, one on surgical, the other on medical technic. The first section occupies 520 pages.

In the surgical section the chapter headings will indicate the general arrangement of material, viz., Hernias, Plastics, Fistulas and Bladder Operations, Uterine Operations, Adnexal Operations, etc. There are also chapters on Suture and Drainage Material, on Anesthesia, with a considerable discussion of Spinal Anesthesia, and on the Care of Operative Gynecological Patients.

In the Medical Section there is a detailed description of the use of diathermy in pelvic infections of gonorrheal origin. In the gas inflation test for tubal patency he uses only a glass syringe, a uterine canula

and a pressure gage—an astonishingly simple procedure compared, for example, to that followed by Rubin.

E. C. HARTLEY, M.D.

CLINICAL MEDICINE: Paul H. Ringer, 3rd Revised edition. \$3.00. Philadelphia: F. A. Davis Co.

A comprehensive volume, practical, well presented, with material that is up to date.

The author states that the book is bereft of dogmatic material, and may be amplified to suit individual teachers' needs. I find this to be very true, and for this reason an excellent volume for outline material.

The author, in my opinion, has carefully considered the needs of the student nurse, and compiled his material accordingly. Particular attention has been given to pathology.

The volume does not give as much detail as the average clinical volume for teaching. The objection, however, to most clinical books for teaching has been too much detail.

INEZ PEYTON.

TUBERCULOSIS AMONG CHILDREN: J. Arthur Myers, Ph.D., M.D., F.A.C.P., with chapters by C. A. Stewart, M.D., Ph.D., and Paul W. Giessler, M.D., Minneapolis. 208 pages. Illus. Price, \$3.50. 1930. Charles C. Thomas, Publisher, Springfield (Ill.) and Baltimore.

Tuberculosis in children and its relation to tuberculosis in adults has received intensive study during the past decade. The author has reviewed the vast literature fully and has combined it with his personal experience in private practice and as Medical Director of the Lymanhurst School for tuberculous children, in the preparation of this book. The result is a compact summary of our present day knowledge of tuberculosis in children as generally accepted by foremost teachers and clinicians.

The writer emphasizes the point that tuberculosis is a family disease which spreads largely by direct contact. Bovine infection is still a factor. The varying incidence of tuberculous infection in different parts of the country is pointed out, showing that tuberculous infection no longer may be considered universal. Tuberculous infection in infancy does not have the grave prognosis it once had. The importance of the tuberculin test at all ages is stressed, the Mantoux or intradermal being considered preferable to the von Pirquet. As to the general value of the skin test, the author states, "Tuberculin tests applied to all children of a community is the best method of approaching the tuberculosis problem. Among the positive reactors will be found children with the disease and among their adult associates will be found open cases of tuberculosis previously unrecognized."

The subject of "The Childhood Type of Pulmonary Tuberculosis" is treated fully, as it is found in infancy and later childhood. The necessity for routine x-ray films in all children reacting positively to tuberculin is emphasized. Family history is likewise important—

symptoms and physical signs may be entirely absent. The study of tuberculosis in children is of great value because such a large number of the 'teen age group developing the adult type of pulmonary tuberculosis shows x-ray evidence of a childhood type of pulmonary tuberculosis.

Well written chapters are contributed by Dr. C. A. Stewart on "Tuberculous Meningitis" and "Chronic Non-Tuberculous Basal Pulmonary Diseases in Childhood," and by Dr. Paul W. Giessler on "Tuberculosis of the Bones and Joints."

This brief volume should be of value to the medical student, general practitioner, pediatrician and to all those interested in tuberculosis in children. Each chapter contains a short summary and a very complete bibliography which is valuable for reference work.

P. M. MATTILL, M.D.

NEW AND NON-OFFICIAL REMEDIES, 1930. Cloth. Price, \$1.50. Pp. 481; xlviii. Chicago: American Medical Association, 1930.

The present edition contains all of the features that have in the past made New and Non-official Remedies such a reliable and efficient guide to the physician who wishes to inform himself on the newer medicinal preparations: logical classification of preparations, with authoritative articles on each class; complete and carefully written descriptions of preparations; elaborate indexes; and a useful cumulative list of references to the literature on articles not accepted by the Council. Among the more important revisions that appear in this edition are those of the general articles, Barbitol and Barbitol Compounds, Digestive Enzymes, Cod Liver Oil and Cod Liver Oil Preparations, Ovary, Pituitary Gland, Radium and Radium Salts, and Serums and Vaccines. Among the new preparations descriptions of which appear for the first time in this edition are: Bismarsen, which is sulpharsphenamine bismuth; Dial-Ciba, which is diacetylbarbituric acid; Calcium Gluconate-Sandoz, a more palatable and less irritating preparation of calcium; Atoquinol-Ciba, a cinchophen derivative; Pitocin and Pitressin, solutions respectively of the oxytocic and pressor principles of the pituitary gland; Viosterol (the Council name for irradiated ergosterol) in the forms of Viosterol in Oil 100 D, which is irradiated ergosterol dissolved in vegetable oil; and Cod Liver Oil with Viosterol 5 D, which is cod liver

oil with its vitamin D potency enhanced by addition of viosterol. While these new preparations (with the possible exception of Viosterol) do not constitute major additions to the physician's armamentarium, each one gives promise of relative usefulness, and the physician who desires to keep abreast with the progress of therapeutics will familiarize himself with them as well as with the many other new preparations described in this valuable book.

ANNUAL REPRINT OF THE REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR 1929. With Comments that have appeared in The Journal. Cloth. Price \$1. Pp. 81. Chicago: American Medical Association, 1930.

This is the volume in which the Council annually collects the reports on articles found unacceptable during the year. This edition contains also several interesting preliminary reports on preparations which show promise but for which the evidence is not yet sufficient to justify acceptance by the Council. Reports are given on the following products rejected by the Council: Anayodin, claimed to be iodoxyquinolinol sulphonic acid (chiniofon) but marketed under a non-informing name without adequate statement of composition and with unwarranted therapeutic claims; Antiustio, an unscientific mixture marketed under a non-descriptive name with unwarranted therapeutic claims; Kerasol and Keraphen, unoriginal products marketed under non-informing names; Sodiphene, an unoriginal alkaline phenol preparation marketed under a proprietary name with unwarranted therapeutic claims; Borocaine, procaine borate under a proprietary name; Quicamphol (Transpulmin), a quinine preparation for intramuscular injection in the treatment of lobar pneumonia; Toxogon, a preparation of inadequately declared composition marketed under a therapeutically suggestive name; Intramuscular Iron Arsenic Comp. (No. 201) and (Intravenous) Iron Cacod. and Glycerophosphate (No. 202), two irrational and unscientific mixtures exploited with emphasis on the numbers. Other rejected products are: Ovoferrin, Tamerici Salts, Elixir Kacyan-McNeil, and Tablets Kacyan-McNeil. An authoritative article on serum disease and serum accidents by MacKenzie and Hanger is of considerable interest and timely importance.

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